COMMON UROLOGIC PROBLEMS

BENIGN PROSTATIC HYPERPLASIA

Under the aegis of
Board of Education, Urological Society of India

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Issues in BPH: Consensus and Controversies

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Foreword

The Instructional Course organized by the Board of Education of the Urological Society of India at Mumbai in October 2012 aimed at reviewing the current status of a *Common Urologic Problems: Benign Prostatic Hyperplasia*. The deliberations by the faculty spread over 2 days, covered all the aspects of this disease from etiology, evaluation, medical and surgical treatment. The quality of these discussions was of a high nature that prompted us to bring a book, which can be useful to the urologists working in different parts of India. The organizers at Mumbai should be credited for the successful 2-day course and more importantly for getting the deliberations in a book format.

Joseph Thomas M
MS MCh DNB FRCS
Chairman
Board of Education
Urological Society of India

Foreword

Urological Society of India (USI) has been conducting several academic activities round the year including the mock examinations since last several years with gratifying results. This year, the newly formed Board of Education (under the aegis of USI) decided to conduct a focused academic meeting on “Issues in Benign Prostatic Hyperplasia: Consensus and Controversies” in October 2012. I understand this endeavor was aimed at both postgraduates and practicing urologists in mind, we had excellent attendance of 260 delegates from all over India and it was decided to bring out the proceedings of the meeting as a manual. The faculty and contents are impressive. I wish to record my sincere thanks and gratitude to the Chairperson, Board of Education (USI) and the local organizing committee and department at KEM and Nair Hospital for making this first endeavor a success.

JN Kulkarni
MS MCh MNAMS FCPS FICS FACS
Past President
Urological Society of India

Preface

As a member of Board of Education (BOE) of the Urological Society of India (USI), I took the responsibility of the first Continuing Medical Education (CME) of BOE with the immense contribution from Dr Umesh Oza, Dr Hemant Pathak and Dr Anil Bradoo, the CME saw the light of day. The CME was a great scientific experience and it was the general consensus to bring out the proceedings as a manual. The aim was to have a ready reference on a topic close to our heart and dealt with daily basis.

It is our humble effort to bring out this book. I hope, readers will be benefited with the material presented with special efforts of Mr Ramesh Krishnamachari from M/s Jaypee Brothers Medical Publishers (P) Ltd, Mumbai Branch, India.

Sujata K Patwardhan

Contents

1

Monopolar Transurethral Resection of the Prostate

• Ganesh Gopalakrishnan • Harshad Punjani

INTRODUCTION

Benign prostatic hyperplasia (BPH) is a common urological disorder. One population-based study, published in 2001, suggests that it might affect up to 8.4% of men aged 40–49 years and 33.5% of those aged 60–70 years. In the 20th century, open surgical management of BPH became popular. A relatively high-morbidity and expensive procedure, open prostatectomy was gradually replaced by transurethral resection of the prostate (TURP) as the standard surgical treatment of small to medium sized BPH. High success rates, lower costs and shorter recovery times after TURP were among the factors contributing to the gradual replacement of open prostatectomy.

The surgical management of BPH is evolving at a rapid rate, with several new procedures available that challenge transurethral resection of the prostate as the standard treatment in the surgical management of small to medium sized glands.

For most of the 20th century surgeons were investigating newer, less invasive methods of relieving prostatic obstruction.While the obvious minimally invasive route was transurethral, several technical targets were needed to be met. These included adequate visibility, good, reliable light source and a controllable diathermy generator. With the introduction of the Hopkins rod-lens system, Xenon cold light source and solid state electrosurgical generators midway through the 20th century, modern day TURP came of age. This development was aided by the detailed description of the arterial supply of the prostate by Flocks in 1937.

Transurethral resection of the prostate (TURP) is still considered as the gold standard treatment of obstructive BPH. Although TURP is a safe option in the vast majority, it is not without morbidity. The overall mortality is around 0.2% but in the elderly and high risk patients it is considerably higher.

For effective and safe monopolar TURP, the following are necessary—a very good quality and safe, electrosurgical unit (ESU), compatible irrigant fluid, a good camera and light source and sturdy instrumentation. Needless to say that currently all these are freely available to make TURP really the gold standard operation for obstructive BPH.

Monopolar TURP requires the use of a reliable electrosurgical generator. Electrosurgery utilizes a radiofrequency current to cut and fulgurate tissues. The chosen frequency is important in achieving the desired effects without complications. Current ESU operate at 400,000 to 1 million Hz. Such high frequencies avoid undesirable neuromuscular

contractions. The characteristics of the electric current will depend on what effect it has in tissues. A continuously alternating radiofrequency current, sine wave, delivers high current and high power. Such a current generates enough heat to cut tissues. Since the heat is so quickly dissipated, the surrounding tissue is not coagulated and hemostasis is poor. In order to fulgurate the tissue, short bursts of high voltage radiofrequency sine waves with a pause between is necessary.

The generator chosen is very important in deciding on the current delivered during the procedure.The power generated is dependent on the current delivered by the unit and the tissue resistance. Modern generators have the ability to adjust the current based on the tissue characteristics to keep the power constant. Older generators did not have this capability. More modern generators use microprocessors to monitor resistance in specific surgical conditions. Dessication occurs by a slow process of driving water out of the cells. Steam, bubbles and change in tissue color to a light brown hue are features of dessication. Changes in tissue characteristics during a TURP affect the performance of the instruments. Tissue charring has an insulating effect and lowers the efficiency of vaporization. Persistent application of power to one area, results in large scale dessication. This results in an increased resistance in the tissue and this necessitates a further increase in power levels. Fulguration is a superficial charring of tissue and requires a coagulation waveform to be generated by the ESU. This waveform is sparked to the tissue surface and heat is widely dispersed by long sparks and intermittent current application. Thus, energy does not penetrate deeply and only a superficial effect is obtained. The cells dry out quickly but do not vaporize, a char effect is obtained and this results in hemostasis.

Historically water was used as the irrigant fluid for TURP. Water is hypotonic and absorption could result in hemolysis, which can be potentially life threatening. Nevertheless, it is the cheapest fluid and has the clearest vision during resection. Majority of urologists now use 1.5% Glycine. While these fluids can be absorbed to produce electrolyte changes, the problem of hemolysis does not arise as these fluids are isotonic with plasma.

Camera systems have really revolutionized resection today. They have high resolution and the magnification that results make identification of tissue landmarks easy. The fiber optic light cables and Xenon light source in addition makes resection effective.

The discovery of the Hopkins rod-lens system provides unparallel clarity of vision. Resectoscope design has improved significantly and become sturdy. The main limiting factor in TURP is the size of the gland. Large glands in excess of 100 gram could take more than 90 minutes, which many consider to be the safe upper limit of resection time. The use of the continuous flow resectoscope has helped speed up resection times. It has also added a safety net to the operation by keeping the intraprostatic pressure low thus reducing the risk of absorption. Another important choice is whether one uses a thin loop or a thick loop for resections. The thin loop allows for more efficient vaporization and cutting. Since the current is not dissipated over a large area, one can achieve more precise tissue ablation. A thick loop by virtue of its larger surface area disperses current over a broad area. This causes current density to be less and produces more effective hemostasis. The choice of loop is the surgeons preference and is dictated by the level of his experience and his comfort levels with technology.

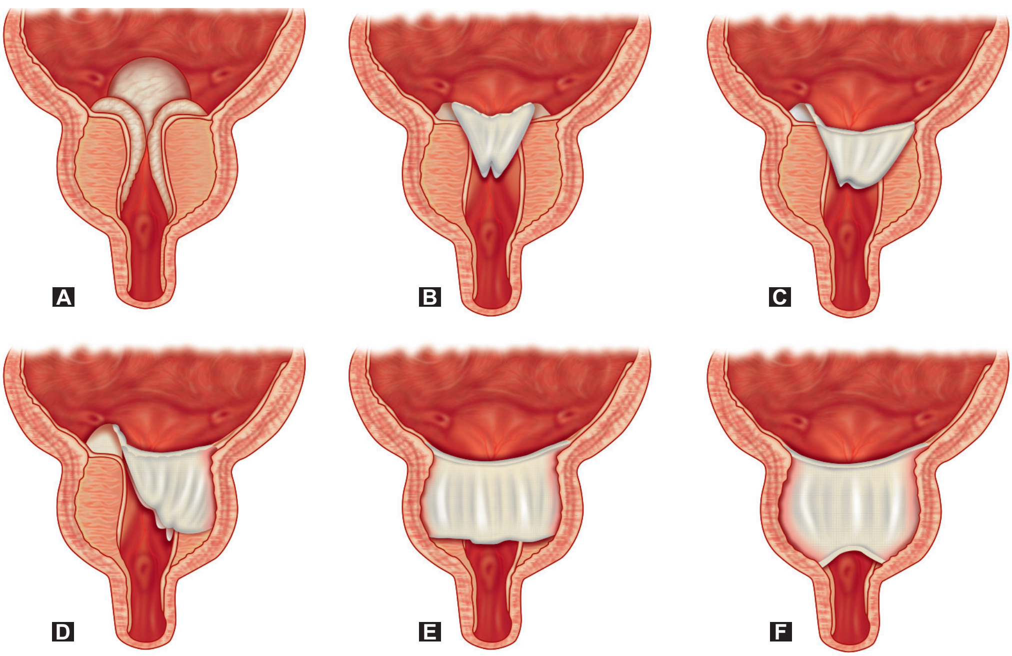
Many surgeons employ suprapubic drainage using an standard Reuters canula or a suprapubic catheter while resecting large glands. This helps maintain low intraprostatic pressures during the resection and also reduces resection times as the bladder does not fill.

There are three main techniques that urologists use for TURP—the Barnes, the Nesbit and the Flocks. Whichever technique one uses it is important to remember that resection must be systematic and in an organized fashion. Each lobe of the prostate is dealt with individually. Hemostasis is achieved and only then does one resect the other lobe. If the prostate is large and there is a time constraint, there is no harm in doing a planned hemiresection of the prostate or coming back a few days later to complete the rest of the resection.

BARNES TECHNIQUE

The Barnes technique starts with resecting the middle lobe at 6 o'clock all the way to the verumontanum. This creates a nice trough in the floor of the prostatic urethra, Once this has been done the right and left lobes are then dealt with separately but one at a time.Resection of the right lateral lobe starts at 6 o'clock and goes around clockwise to 11 o'clock. Similarly the left lobe starts at 6 o'clock but goes round anticlockwise to the 1 o'clock position. If there is a large anterior lobe this is resected separately from the bladder neck to the level of the verumontanum. In case the anterior lobe is not large this strip of tissue can be left intact.

Operative Technique



Figures 1.1A to F: Stages in resection method of Barnes

Stages in resection method of Barnes

Coronal section through lower urinary tract bladder-prostate

a. Arrangement prior to operation
b. Excision of median lobe and basal portions of lateral lobes
c. Further ablation of endovesical part of median and of the left lateral lobe together cut endourethral part of both
d. Complete excision of left lateral lobe except for an apical remnant
e. Same procedure on right hand side, only apical tissue now remains on either side
f. Final arrangement after completion of resection.

NESBIT TECHNIQUE

The NESBIT technique is probably most commonly used by urologists for TURP. This technique of resection is based on the arterial supply to the prostate and aims to disconnect major bleeders during the early phase of resection, thus providing a relatively bloodless field for speedy resection of the prostate.

Resection starts at 11 o'clock by creating a trough at the bladder neck; resection then continues in this trough systematically towards the apex. This effectively detaches the lateral lobe, which is displaced medially and devoid of its blood supply. This detached lobe as well as the middle lobe is then resected together. One of the potential drawbacks of this technique is that in large glands a beginner could lose his way due to the large volume of prostatic tissue in the floor of the fossa.

Operative Technique

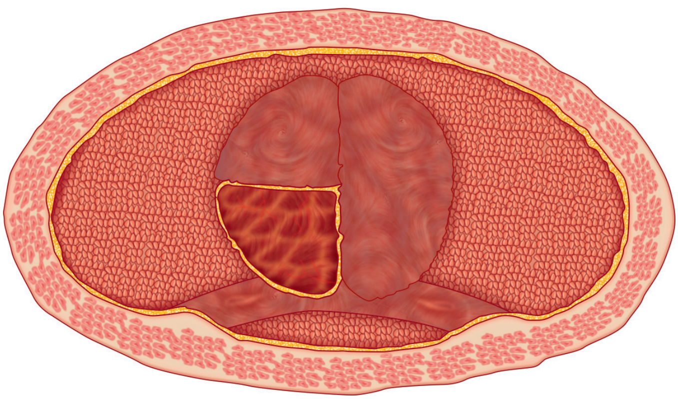
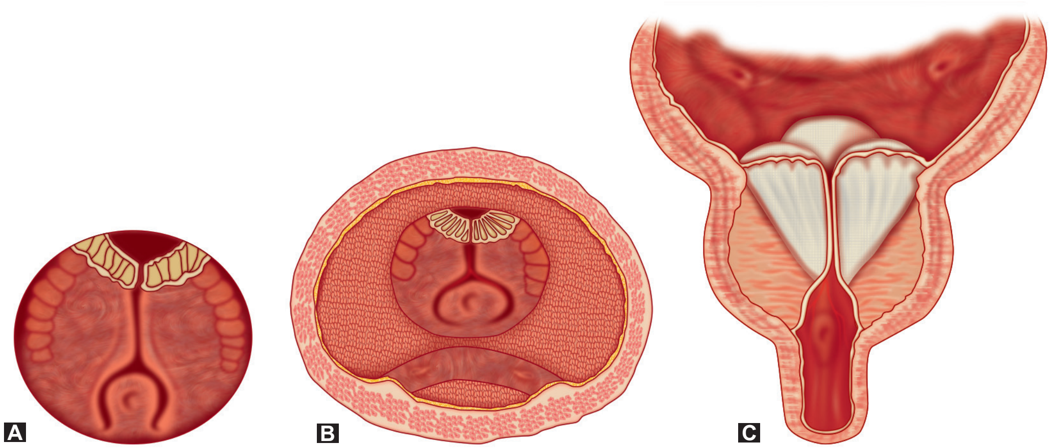


Figure 1.2: Cross section through bladder above ureteric orifices

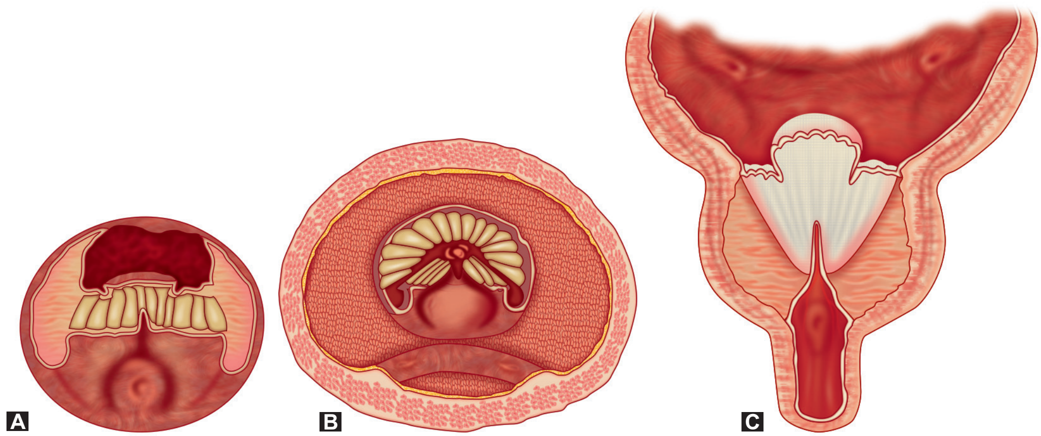
Left lobe has been divided from a 9 o'clock position at its equator and at right angles to capsule by trench cut. Tissue is subsequently removed down to the floor of prostatic cavity in series of horizontal slices. The procedure then continues with an identical approach to the opposite side.

Step 1: Formation of ventral pattern

a. Endoscopic appearance
b. View from bladder
c. Lateral lobe domes seen from above.



Figures 1.3A to C: Step 1: Formation of ventral pattern



Figures 1.4A to C: Step 2: Cutting trench and tissue ablation

Step 2: Cutting trench and tissue ablation

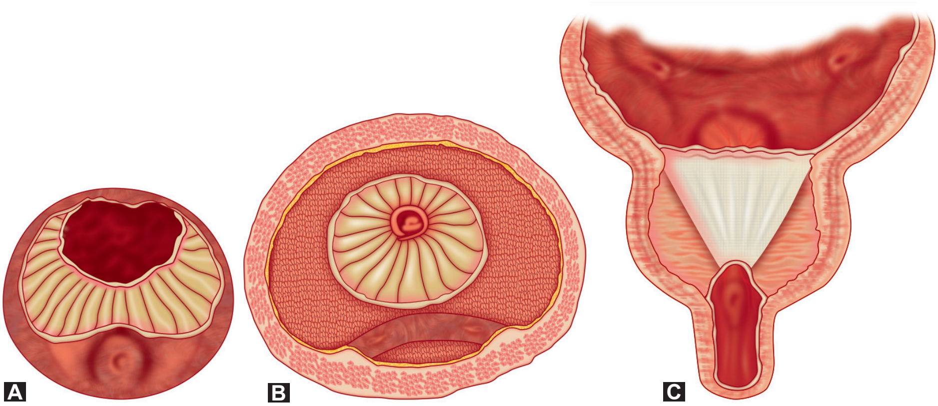
a. Endoscopic appearance
b. View from bladder
c. View from ventral towards lateral lobes domes.

Step 3: Resection down to the floor of cavity

a. Endoscopic appearance: Lateral lobes and median lobe have been ablated down to the floor of the cavity
b. View from bladder: Circular funnel of remaining tissue seen
c. View from ventral towards lateral lobe domes: Conical space easily seen together with the distal untouched portion.

Step 4: Cone excision

Clear the prostatic capsule of adenoma tissue by excavation and apical resection.



Figures 1.5A to C: Step 3: Resection down to the floor of cavity

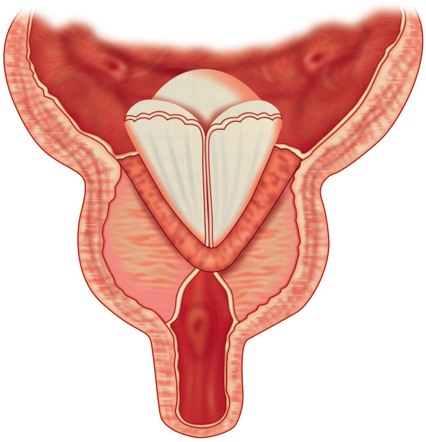


Figure 1.6: Step 4: Cone excision

ALCOCKS AND FLOCKS TECHNIQUE

The Flocks technique is a bit complicated. In this technique, the prostate is divided into four quadrants and each quadrant is resected separately.

Operative Technique

In some large glands, the prostate lobes extend beyond the verumontanum and resection must include these areas.

It is also acceptable that in very large glands a two-stage TURP be done. On one day, one lobe is resected and a few days later during the same hospitalization, the other lobe(s) are resected. There is literature evidence that hemiresection of the prostate as a planned procedure also results in normal voiding.

Meticulous attention to hemostasis is necessary to prevent catheter blockage post-operatively. A 22 Fr or 24 Fr size 3-way catheter is used by most urologists for bladder drainage.The catheter balloon is inflated as per the surgeons choice. It is important to remember that larger balloon volumes can produce significant bladder spasms. The choice of instituting postoperative irrigation is surgeons' preference and is usually carried out for a minimum of 24 hours after surgery.

Transurethral prostatectomy is an operation that distinguishes the "men from the boys". It is an operation that is both difficult to teach and also learn. However, the advances in camera systems have overcome both these drawbacks. The advent of other minimally invasive treatments for the prostate especially laser prostatectomy has challenged the gold standard procedure. Only time will decide if it will continue to remain so.

2

Bipolar Transurethral Resection of the Prostate

• RM Meyappan

INTRODUCTION

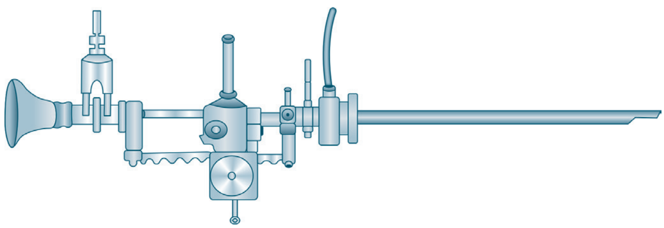
Electrosurgery is the use of radiofrequency (RF) currents to both cut and coagulate tissues. Electrosurgery employs alternating currents that pass from an active electrode through the patient and return to the generator. As the tissue resists the current flow, tissue heat is generated.

The tissue heating produces both the cutting and coagulating actions. Most under water cutting procedures are demanding because of the high impedance provided by the water and the need for high power generator.

Historical Perspective

William T Bovie 1926

Father of Electrosurgery



Stern –Mc-Carthy instrument (Progenitor of resectoscope)

BIOPHYSICS OF ELECTROSURGERY

Cutting
– Continuous current
– Sinus waveform

Coagulation
– Interrupted pulses of current
– Square waveform

Types of Electrosurgery

- Monopolar
- Bipolar

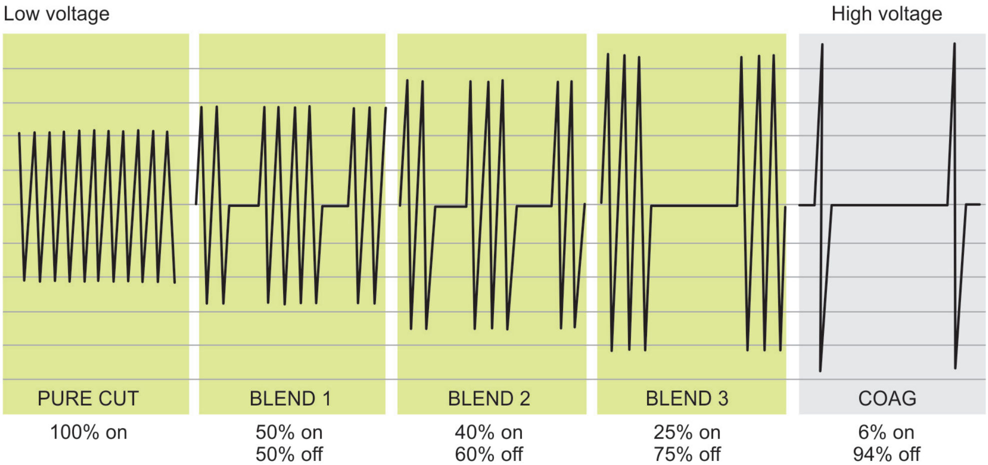


Figure 2.1: Waveforms

Monopolar TURP Technology

Electric current

↓

Loop

↓

Non-conducting irrigant

↓

Tissue (Body)

↓

Indifferent electrode (Neutral)

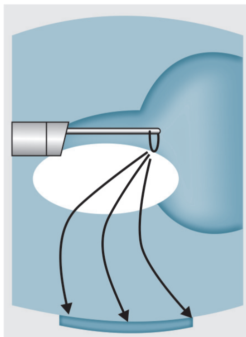


Figure 2.2: Monopolar

Set up for an isolated surgical diathermy system in the monopolar mode

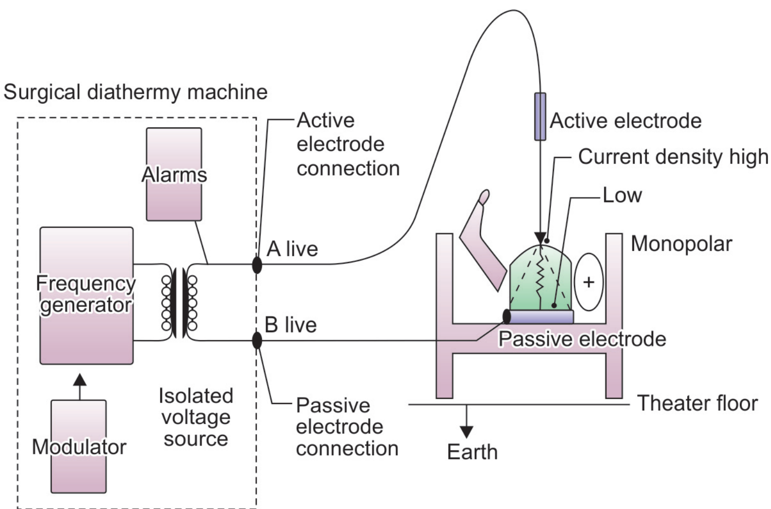


Figure 2.3: Monopolar circuit

Definition of Bipolar Electrode

A bipolar electrode is defined as an electrode that has two active electrodes attached to a single support, and a structure that allows high-frequency electric current to pass through these two electrodes when electrified (International Electrotechnical Commission 1998).

Bipolar Technology

High-frequency current
↓
Active electrode in loop
↓
Conducting irrigant
↓
Plasma
↓
Tissue
↓
Indifferent electrode in loop

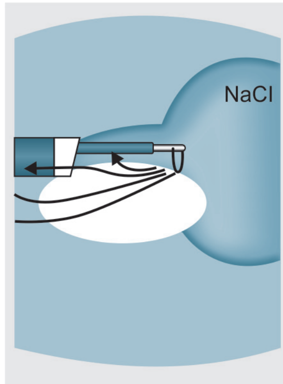


Figure 2.4: Bipolar circuit

Quasi-Bipolar

In some devices, the current does not flow exclusively between two electrodes (i.e. definition of bipolar electrosurgery), instead, the current runs to a negative pole through sheath of the resectoscope.
Example: Olympus TURis system

Comparison

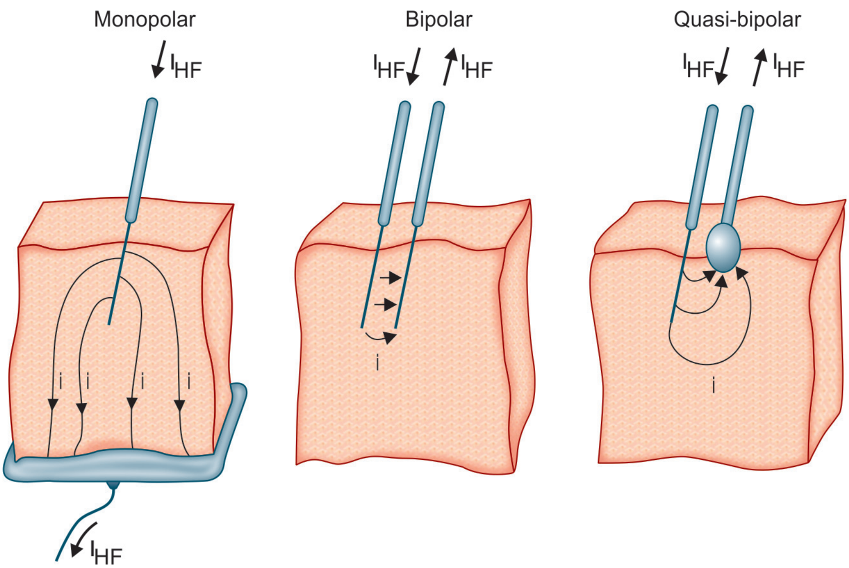


Figure 2.5: Diathermy variants comparison

TECHNICAL MODIFICATIONS OF LOOPS

Bipolar devices can be distinguished by the way in which the active and indifferent electrodes are arranged:

- Two different loops (parallel or opposite)
- Using the distal end of the resection loop
- Using the working element of the resection shaft.

VISTA-ACMI

- First bipolar resectoscope (withdrawn from market now)
- Used two parallel loops, of which the proximal loop represented the active electrode.

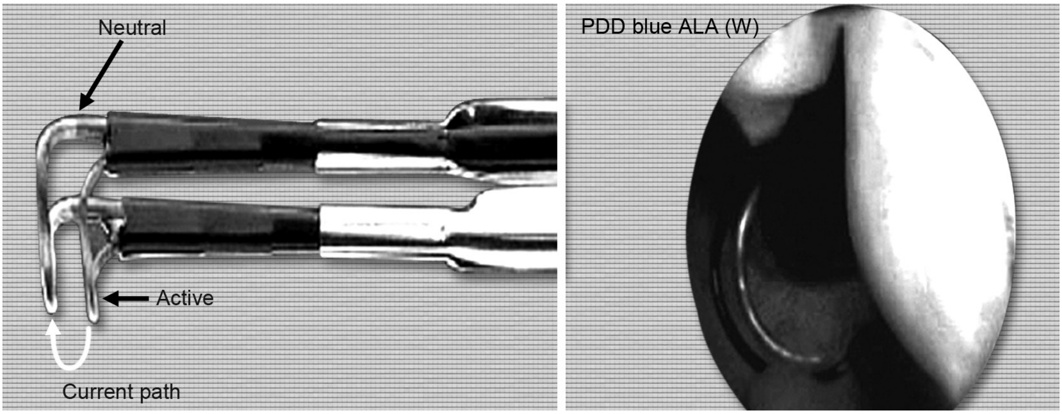


Figure 2.6: VISTA-ACMI bipolar

GYRUS System

- It introduced "plasmakinetic" resection
- It uses a single platinum-iridium loop as active electrode, whereas on the same axis (axipolar) the distal end of the loop (stainless steel electrode separated by a ceramic insulator) serves as neutral electrode
- The loops are designed for single use.

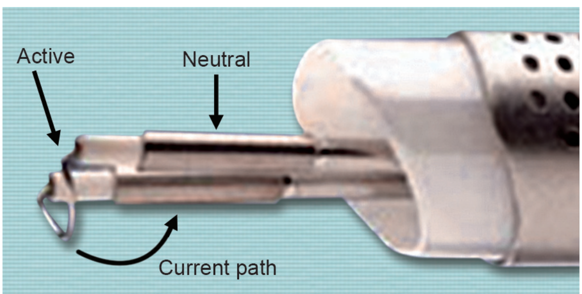


Figure 2.7: GYRUS system

Karl Storz System

- The design of the resectoscope consists of two opposite loops with the passive electrode as counterpart
- The loops are designed for multiple uses.

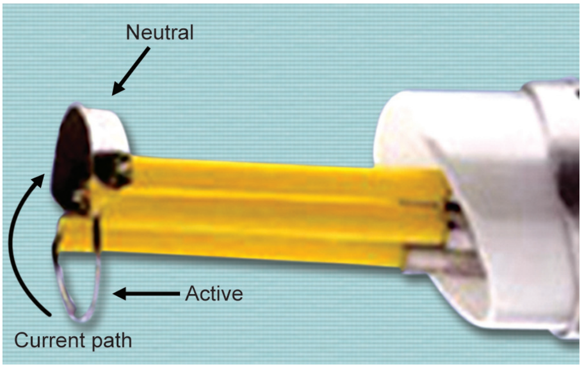


Figure 2.8: Karl Storz system

Olympus System

- Uses the resectoscope sheath as a neutral electrode
- By exchanging the working element, the device can be modified for transurethral resection in saline (TURis)
- The loops are designed for multiple uses with a smaller size.

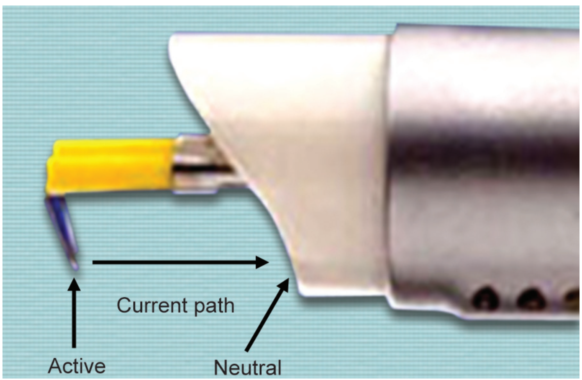


Figure 2.9: Olympus system

TRANSURETHRAL RESECTION IN SALINE (TURIS) PROCEDURE

Plasmakinetic Button Electrode

The button electrode shape combined with resection-in-saline technology provides a safe and easy-to-use solution to tissue management challenges.

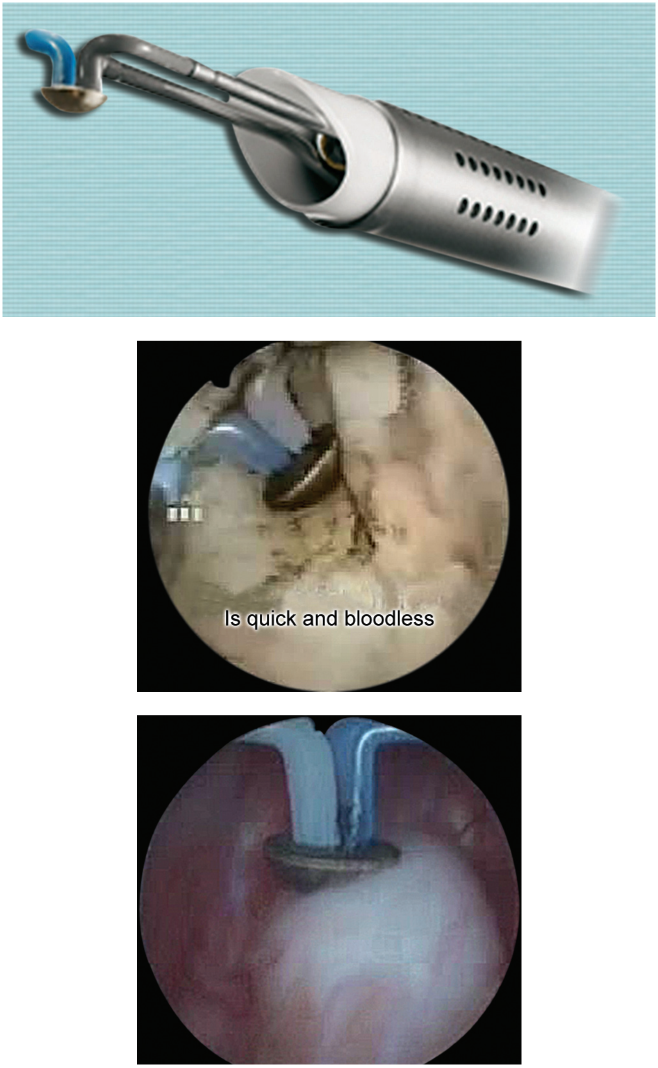
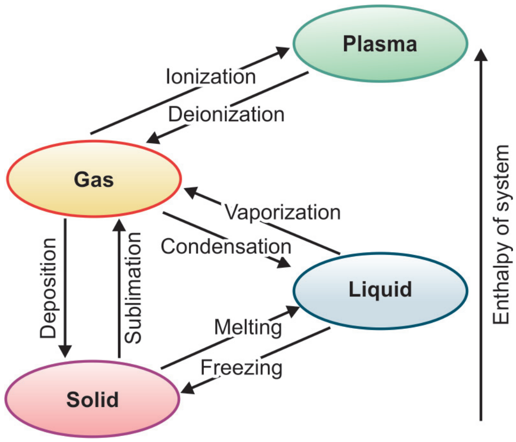


Figure 2.10: Plasmakinetic button electrode

Creation and Role of Plasma

Plasma Definition

- The plasma, also called "the fourth state of matter" is a partially ionized gas containing free electrons and cations. Plasma is conductive.
- These gas molecules from excited state return to their initial states with emission of electromagnetic radiation with a specific color.
- Orange for sodium.
- Blue/purple for potassium.



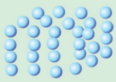
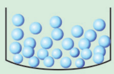
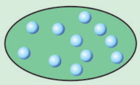
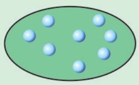
Solid	Liquid	Gas	Plasma
Example Ice H_2O	Example Water H_2O	Example Steam H_2O	Example Ionized gas $H_2 \rightarrow H^+ + H^+ +$ $+2e^-$
Cold T<0°C	Warm 0<T<100°C	Hot T<100°C	Hotter T<100,000°C I>10 electron volts
			
Molecules fixed in lattice	Molecules free to moves	Molecules free to move, large spacing	Ions and electrons move independently, large spacing

Figure 2.11: Four states of matter

Plasma Formation

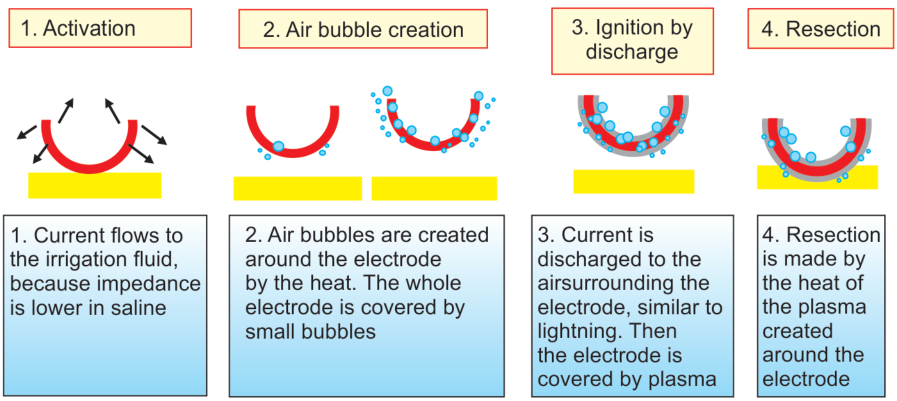


Figure 2.12: Plasma formation

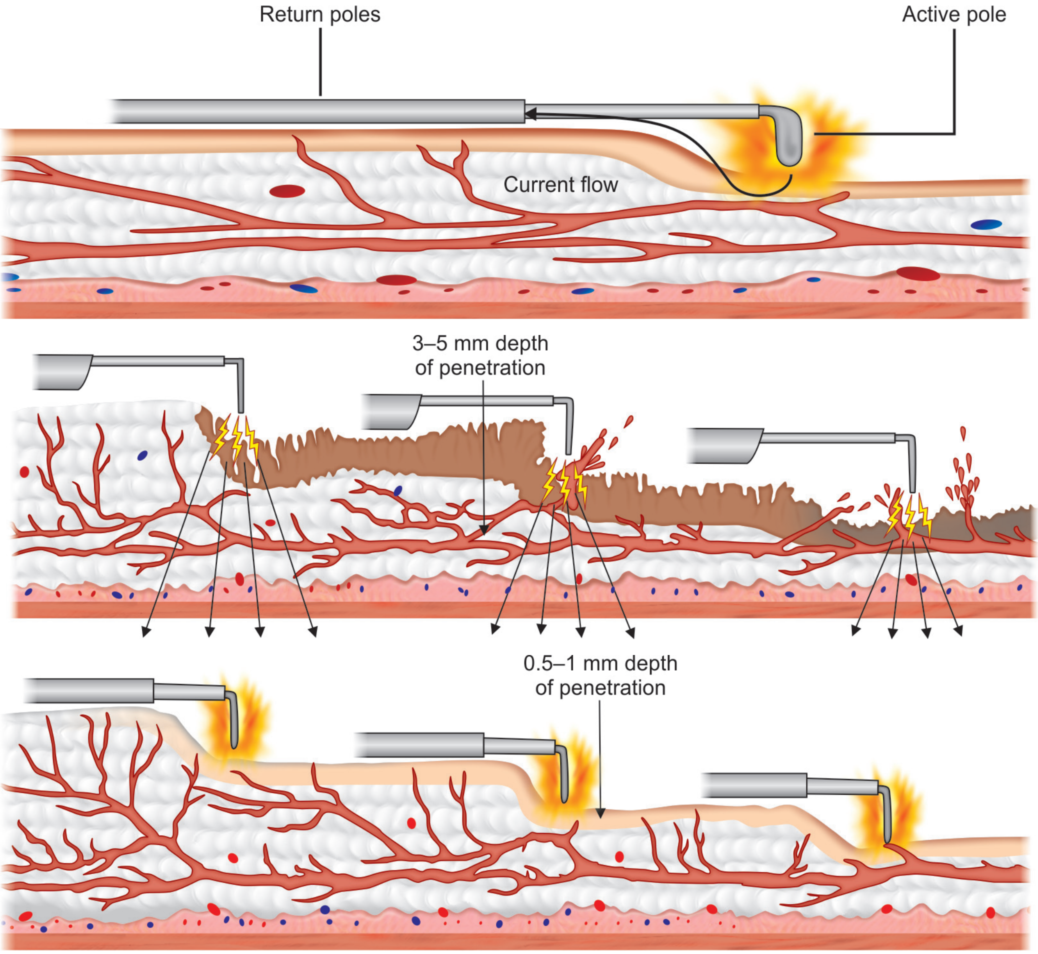


Figure 2.13: Depth comparision in mono- and bipolar current

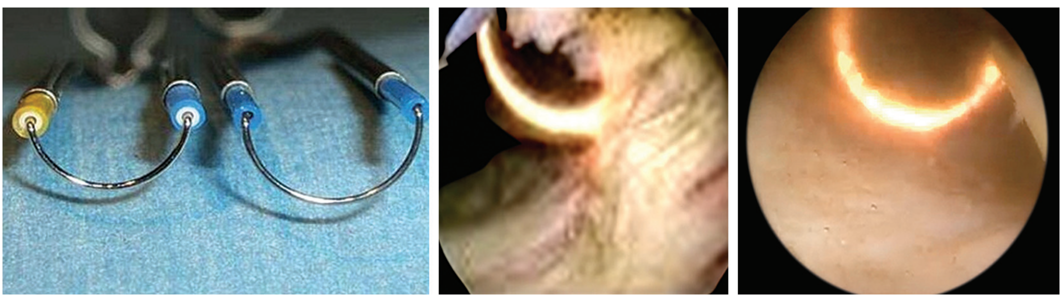


Figure 2.14: Orange plasma

Bipolar TUR: Procedural tips

Warm saline solution

- Necessary energy for creating the plasma is lower
- Operating time shorter
- Initial cut faster and easier (less energy applied).

Active electrode in contact with the tissue?

- Yes, if not you need more energy to create the plasma

Cutting rate by the surgeon

- Faster cutting rate: less energy application, i.e. minimal hemostasis
- Relatively slow cutting rate: more energy application, i.e.stronger hemostasis.

Irrigation

The use of physiological sodium chloride for irrigation practically eliminates the risk of TUR syndrome (hyponatremia), but not the risk of fluid absorption. Fluid overload with sodium chloride (i.e. following capsular perforation) may have deleterious consequences, particularly in patients with cardiac risk factors.

TURis Coagulation

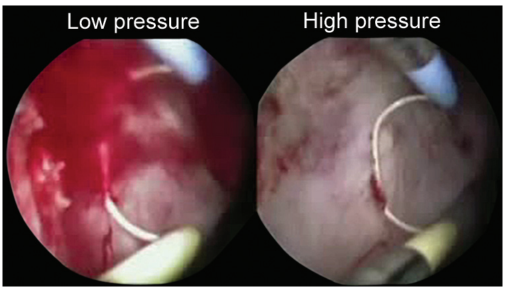


Figure 2.15: TURis coagulation

Advantages of Bipolar TURP

- Less conductive trauma (i.e. resulting to a lower rate of bladder neck stenosis or urethral strictures)
- Elimination of TUR-syndrome (i.e. hyponatremia)
- Lower risk of capsular lesion (i.e. decreased stimulation of pelvic floor)
- Better visual orientation (i.e. reduced coagulation depth)
- Self-cleaning of the loop (i.e. by high energy level at plasma ignition).

Disadvantages of Bipolar TURP

- Higher risk of conductive trauma if current is deviated via sheath and insufficient lubrication (Quasi-Bipolar).
- Risk of recurrent bleeding due to smaller coagulation zone.

Table 2.1: Monopolar versus bipolar TURP

Monopolar resection	*Bipolar resection*
Deep necrosis, damage/thermal margins (3–5 mm) into surrounding structures	Low depth of penetration (0.5–1 mm)
Current travels through patient	Bipolar energy is located only at the device's tip
High voltage needed to provide the desired tissue effect	Much lower voltage is required
Lack of control	Better control
	The plasma layer avoids the sticking effect of the resected tissue on the loop

CONCLUSION

"Bipolar TURP provides desired clinical outcomes with improved safety, reduced complications and faster healing time."

Bipolar TURP is it a New Gold Standard…?

Five types of bipolar resection devices have been developed: The plasmakinetic (PK) system (Gyrus), transurethral resection in saline (TURis) system (Olympus), Karl Storz, and Wolf.

Guidelines on BPH EAU -2012

Efficacy

- Monopolar vs bipolar TURP
- Improvement in short term
  - Qmax (10.5 mL/s vs 10.8 mL/s)
  - AUA-SS/IPSS (-15.2 vs -15.1)
- After 3 years, the initially observed significant improvements were
  - Bipolar and monopolar arm
  - IPSS (6.8 vs 6.2)
  - Qmax (20.5 vs 21.5 mL/s)

Tolerability and Safety

- Overall rate of adverse events was significantly lower with bipolar TURP compared to monopolar TURP (28.6% vs 15.5%)
- Main advantages of bipolar TURP
  - Reduced blood loss
  - Decreased incidences of postoperative clot retention
  - Decreased blood transfusions
  - Less duration of postoperative catheterization
  - Hospitalization times were shorter.

TUR Syndrome

- TUR syndrome has not been reported with bipolar TURP
  - Due to the use of physiological saline irrigation fluid reduced fluid absorption during the procedure
  - Bipolar TURP offers an attractive alternative to monopolar TURP in patients with lower urinary tract symptoms (LUTS) secondary to BPO with similar efficacy but lower morbidity
  - Furthermore, the safety of bipolar TURP allows more time for training and teaching of urology residents.
- Sixteen RCTs (1406 patients) were included

  Conclusion:
  - No clinically relevant differences in short-term efficacy exist between the two techniques
  - Bipolar TURP is preferable due to a more favorable safety profile (lower TUR syndrome and clot retention rates) and shorter irrigation and catheterization duration.
- Results: The hemostatic capacity of bipolar current is shown to be superior in ex-vivo studies.
  - Clot retention and transurethral resection syndrome rates are significantly lower in patients treated with bipolar resection.
  - Catheterization time and length of hospital stay are statistically shorter as compared with monopolar resection.
  - Urethral stricture rates do not differ significantly between arms.

  Conclusion—Bipolar shares similar clinical efficacy with monopolar transurethral resection of the prostate, durable in time with low long-term complication rates. It has minimized bleeding risk and eliminated transurethral resection syndrome.
  - Earlier removal of the urinary catheter
  - Earlier discharge from hospital,
  - Decreasing complications.
- Prospective randomized trial comparing bipolar TURP with standard monopolar TURP
- Conclusion:
  - Bipolar technology is a safe and effective alternative to standard monopolar TURP,
  - Has the advantages
  - Reducing TUR syndrome
  - Less conductive trauma
  - Cheaper irrigation solution (saline)
  - Shorter duration of catheterization.

Monopolar TURP was gold standard for decades however now Bipolar TURP has replaced it.

SUGGESTED READING

1. Autorino R, De Sio M, D'Armiento M. Bipolar plasma. Kinetic technology for the treatment of symptomatic benign prostatic hyperplasia: evidence beyond marketing hype? BJU Int. 2007;100(5):983-5.
2. Mamoulakis C, Trompettar M, de la Rosette JJ. Bipolar transurethral resection of the prostate: the 'golden standard' reclaims its leading position. Curr Opin Urol. 2009;19(1):26-32.
3. Mamoulakis C, Ubbink DT, de la Rosette JJ, et al. Bipolar versus monopolar transurethral resection of the prostate: a systematic review and meta-analysis of randomized controlled trials. J Eur Urol. 2009;56:789-809.
4. Starkman JS, Santucci RA. Comparison of bipolar transurethral resection of the prostate with standard transurethral prostatectomy. BJU Int. 2005;95(1):69-71.

3

Thulium Laser

• Sujata K Patwardhan

PHYSICAL PROPERTIES

(Thulium: yttrium–aluminum–garnet)
- Continuous wave laser
- Wavelength—2013 nm, absorption length: 250 µm
- Wavelength close to absorption peak of water
- Small depth of penetration—high energy density—rapid vaporization of tissue
- Higher tissue ablation and hemostasis comparable to KTP laser.

Ablation Capacity
- 6.56 g/10 min (70 W Tm: YAG) using 550 µm bare fire, as compared 3.99 g/10 min (80 W KTP)
- Using 120 W Tm: YAG: 16.41 g/10 min
- Rates reduces when core thickness increased to 800 µm.

Bleeding Rate: 0.16 ± 0.07 g/min (70 W).

Depth of Coagulation: 264.7 ± 41.3 µm, 2.5 times less than KTP, as good as TURP.

What all can be done?

- Thulium laser vaporization of the prostate (ThuVaR)
- Thulium laser vaporesection of the prostate (ThuVARP)
- Thulium laser vapoenucleation (ThuVEP)
- Thulium laser enucleation of the prostate (ThuLEP).

Evolution of Thulium Laser in Management of BPH

First published in 2005; Xia et al:
- Described "thulium laser resection of the prostate tangerine technique"
- *Next*: Vaporesection (simultaneous resection + vaporization)
- Proven to be safe and effective; Bach et al, 2009
- *Final leap*: 'Thu:YAG vapoenucleation', followed by ThuLEP (thulium laser enucleation of the prostate); Bach et al, 2010.

Thulium versus Other Lasers

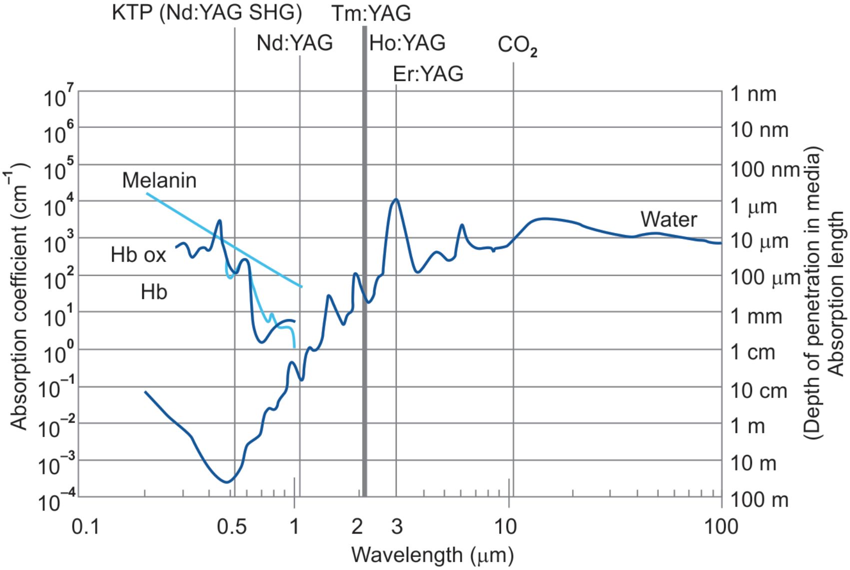


Figure 3.1: Comparison between thulium and other lasers

Continuous versus Pulsed Laser

Table 3.1: Comparison of continuous and pulsed lasers

Continuous	*Pulsed*
Excited by laser diode	Excited by flash lamp
Small steam bubble	Large pulsating steam bubble
Supports steam bubble between fiber tip and tissue	Expanding steam bubble used for separation of adenoma from peripheral zone
Bubble: optical contact of laser with tissue	Coagulation achieved by heat within steam bubble
Precise cutting and smoother incisions	

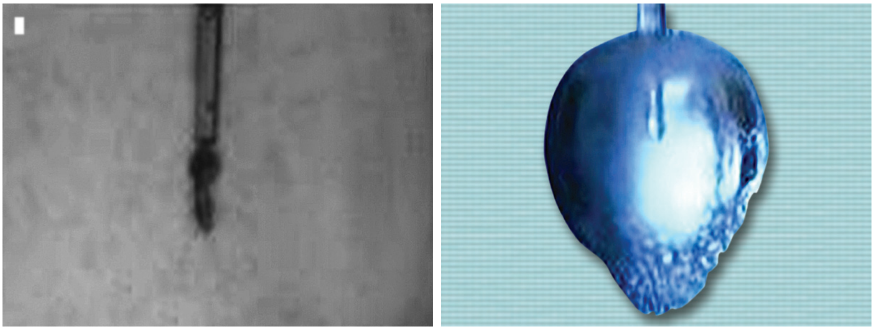


Figure 3.2: Continuous and pulsed laser

EQUIPMENT

Morcellator

Figure 3.3: Morcellator

Morcelloscope

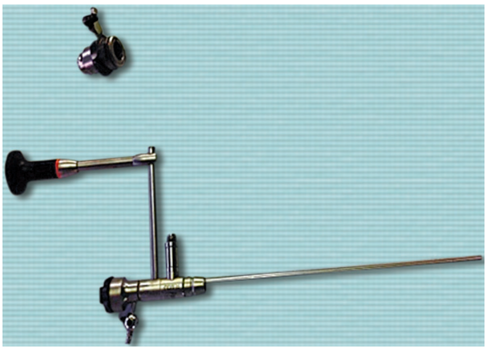


Figure 3.4: Morcelloscope

Morcellator Tip

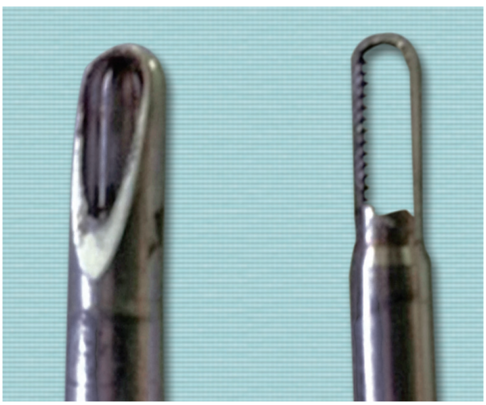


Figure 3.5: Morcellator tip

Working Element and Scope

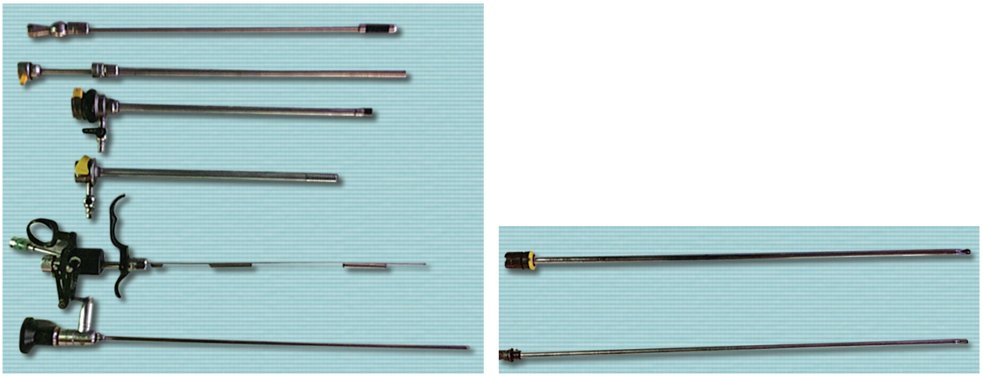


Figure 3.6: Working element and scope

RIGI FIB

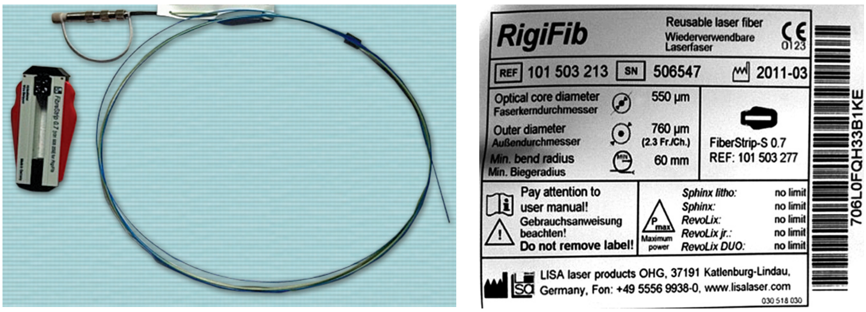


Figure 3.7: Rigi Fiber (550 µm)

Advantages

- Precise cutting
- Smoother incisions
- Greater accuracy
- Energy efficiency
- Minimal collateral damage
- Allows the surgeon to accurately remove the adenoma at the level of the surgical capsule
- Plane is easily distinguishable
- Any sized prostate can be removed.

Disadvantages

- Charring? : No evidence to support
- Increased incontinence and dysuria?
- Can not be used as lithotripter

Complications

Intraoperative

- No TURP syndrome
- Intra- or early postoperative bleeding : 3.4% of patients
- Rate of blood transfusions varied from 0% (17) to 2.2% (2) for ThuVEP
- No transfusions during or after vaporesection of the prostate.

Early Postoperative

- Symptomatic UTI : 6.8% (8.3% UTI after TURP)
- Second look procedure : 2.2%
- Recatheterization required: 1.1%
- Higher rate hematuria (3.1% vs 1.4%) and UTI (15.4% vs 4.2%) in patients with pre-operative urinary retention
- Transitory early urge incontinence: 23.1% vs 31.3% (TURP)
- Dysuria for ThuVARP in 8.6% versus 7.1% for TURP
- Irritative symptoms 26.2% and 29.3% (TURP).

Late Postoperative
(Follow-up of 18 months after ThuVARP and ThuVEP)

- No re-operation or recatheterizations
- De-novo erectile dysfunction was not reported
- 55% reported retrograde ejaculation compared to 65% after TURP
- Urethral stricture (1.9% vs 6.5% in TURP).

EAU Guidelines on Laser 2011

[ThuVARP Vs TURP (LE:1b)]
Equivalent effectivity: small and medium volume glands
Tm:YAG : Shorter catheterization time
Shorter hospitalization time.
Decreased complications (intra and postoperative bleeding).

Recommendations

Table 3.2: Recommendations for patient

	LE	*GR*
ThuVARP is an alternative to TURP for small and medium sized prostate	1b	A
ThuVARP and ThuVEP are suitable for patients at risk of bleeding or taking anticoagulant	3b	C
ThuVARP and ThuVEP are suitable for patients at risk of bleeding or taking anticoagulant medication	1b	A

4

Holmium Laser

• Anil Varshney

EVOLUTION OF LASER PROSTATECTOMY

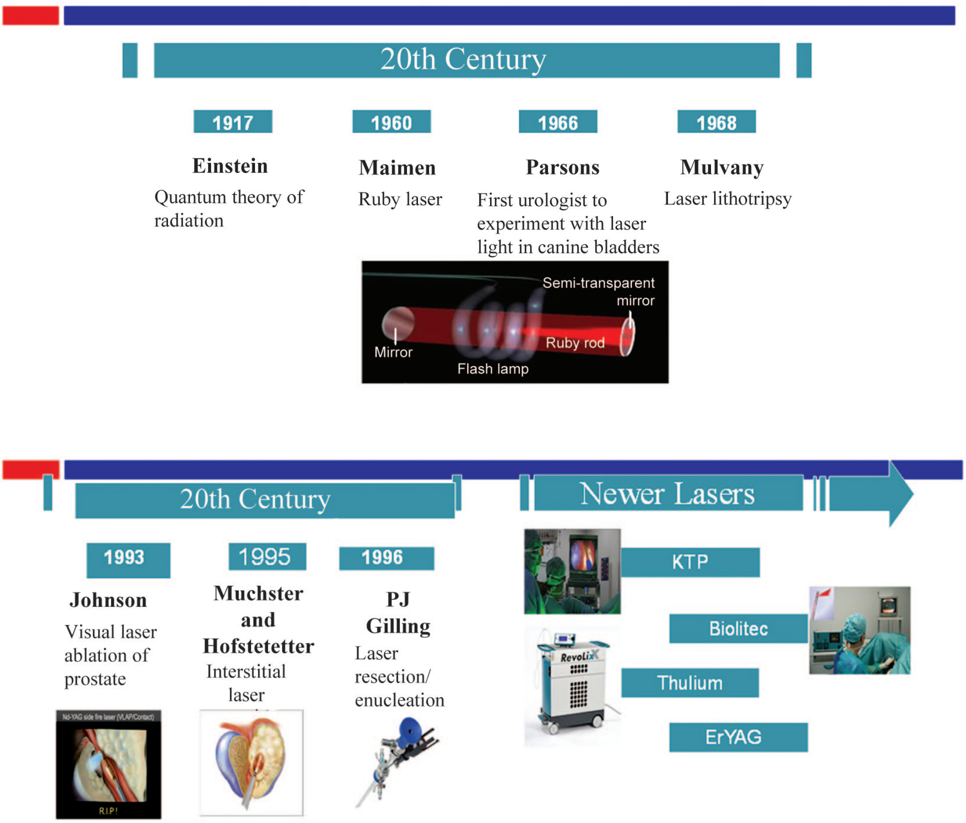


Figure 4.1: Evolution of laser prostatectomy

LASERS WAVELENGTH

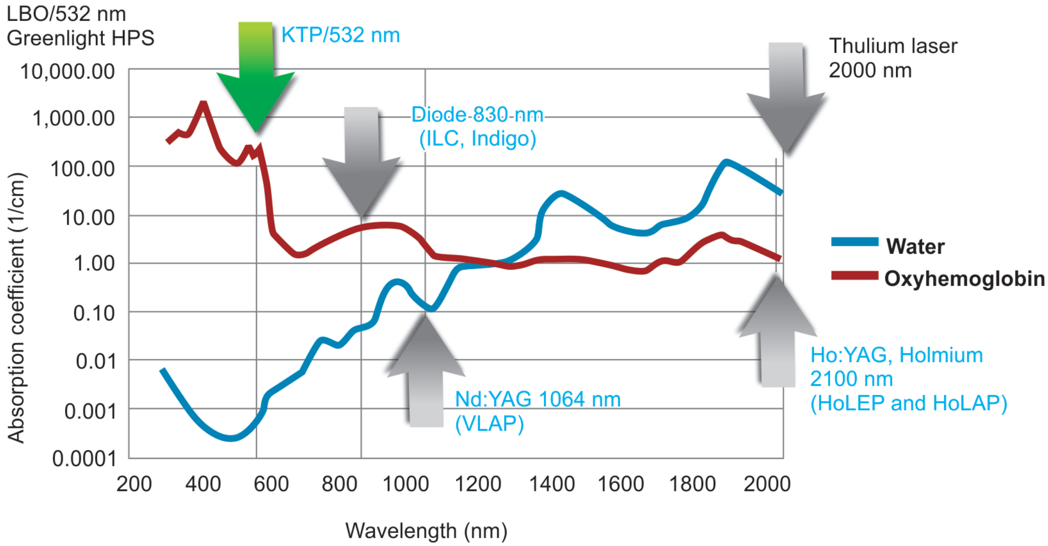


Figure 4.2: Wavelength of different lasers

PENETRATION DEPTH OF LASERS

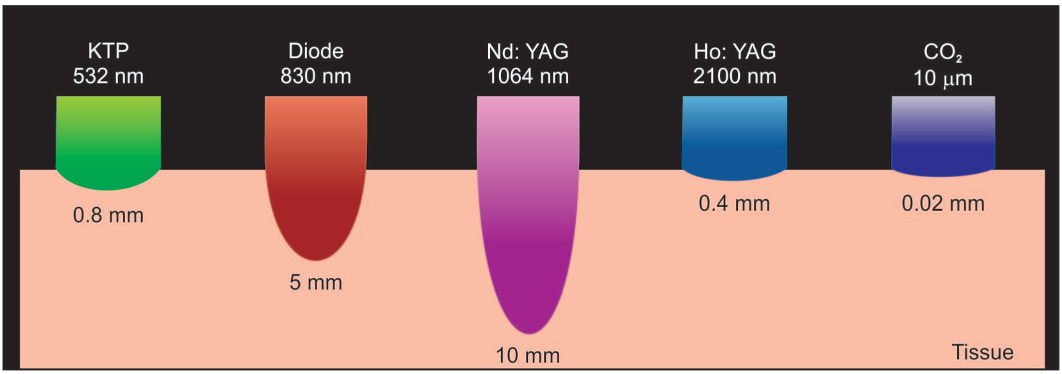


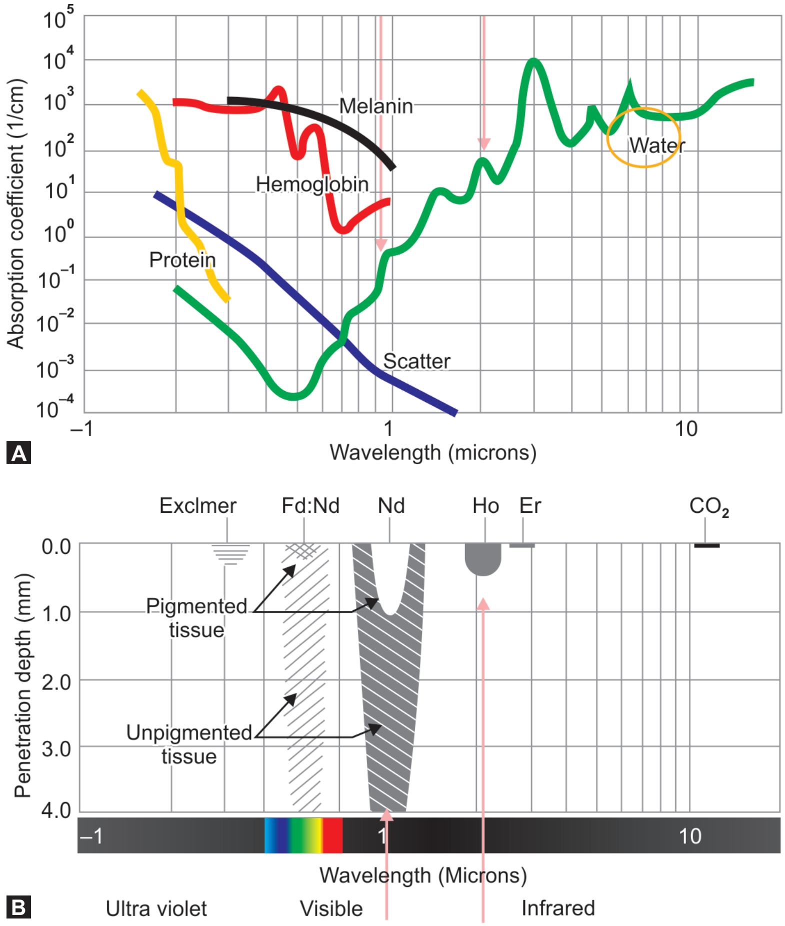
Figure 4.3: Penetration depth of different lasers

Development of HoLEP

- Bladder neck incision
- HoLAP - Ablation
- HoLRP - Resection
- HoLEP - Enucleation

ABSORPTION IN WATER

- Highly absorbed by water (and water-filled tissue)
- Penetration depth in tissue < 0.5 mm
- Precise cutting and coagulation
- Spares healthy tissue.



Figures 4.4A and B: Laser absorption and tissue penetration

WHY HOLMIUM?

- Tissue ablated faster than heat is conducted into surrounding tissues.
- Holmium delivered in pulsed mode and each pulse has enough energy to vaporize tissue.

- "What you see is what you get" effect with Holmium contrasts coagulating effects of Nd:Yag and KTP lasers whose wavelengths penetrate deeper and extend below the visible tissue surface.
- Hemostasis is superior with Holmium because of its localized coagulation effect compared to electrocautery and Nd:YAG/KTP laser, which produce deeper thermal injury.

EXPECTATION FROM LASER ENERGY

- It should be enough to achieve
  - Complete enucleation in the correct plane
  - Adequate hemostasis
  - Efficient energy application
  - Lowest possible energy to get the desired effect
  - Pulsed laser
  - Good technique of dissection.

Note: Holmium 100 W Laser offers a large number of permutations and combinations. At 2 Joules and 50 Hz it acts as a sharp knife without causing any significant thermal damage.

STANDARD SET UP

- 26 Fr continuous irrigation resectoscope
- Laser bridge—Indigenous
- 300 telescope (4 mm)
- 80/100 watt holmium laser
- 550 micron laser fiber
- 26 Fr nephroscope
- Morcellator with tubings
- Percutaneous nephrolithotomy (PCNL) forceps.

Figure 4.5: Standard set up

Laser Bridge—Indigenous Design

- Minimizes bouncing of the fiber
- Prevents any thermal damage to the telescope
- No locking device, total freedom of movement that makes it versatile even in large glands.

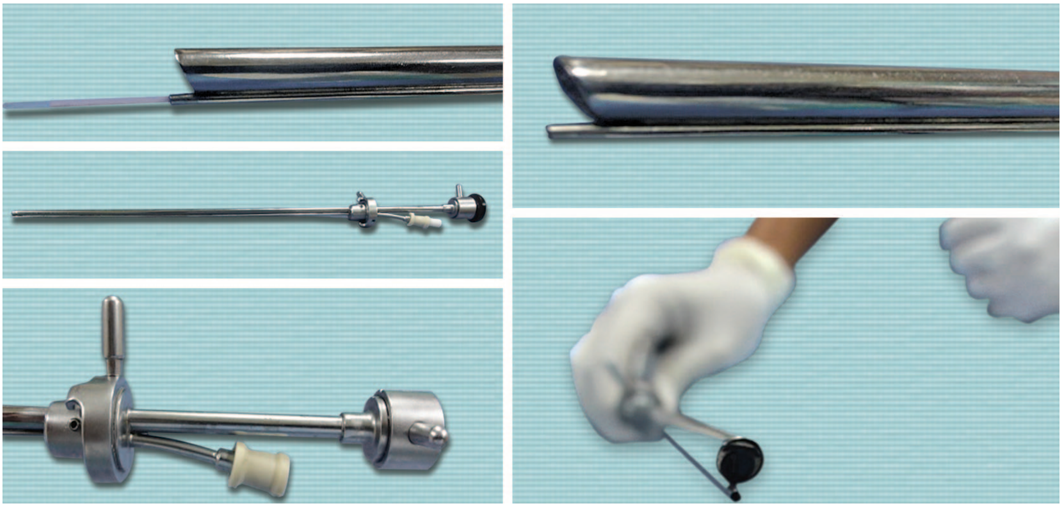
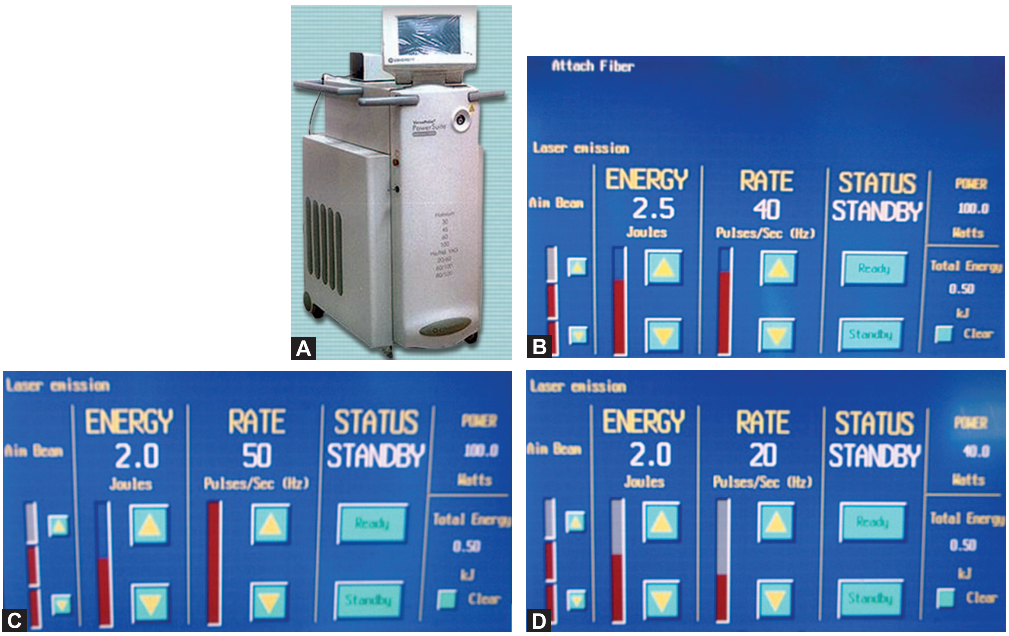


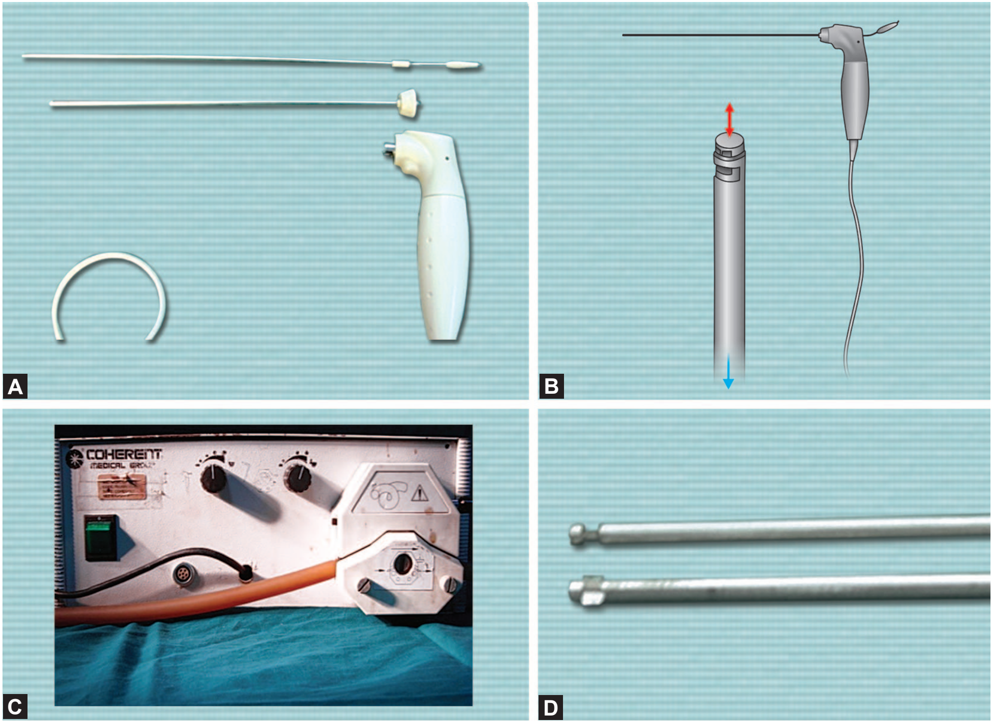
Figure 4.6: Indigenous design of laser bridge

HOLMIUM LASER MACHINE: ENERGY SETTINGS



Figures 4.7A to D: (A) 100 W Holmlum laser machine; (B) Cutting; (C) Coagulation; (D) Apical dissection

INSTRUMENTATION: MORCELLATION



Figures 4.8A to D: Instrument for morcellation

HOLMIUM LASER ENUCLEATION OF THE PROSTATE (HoLEP) TECHNIQUE

- In shelling out the adenoma, the laser fiber moves in exactly the same plane as the surgeon's index finger does when performing open prostatectomy.
- The prostatic lobes are enucleated in their entirety and pushed into the bladder where they are fragmented and aspirated with the morcellator.
- Studies on several thousand patients have demonstrated that HoLEP is a true endourologic alternative to open prostatectomy in large prostates, and glands of more than 400 g have been successfully enucleated

Technique

- Size and anatomy dictates the type of procedure most appropriate for the patient
- Two techniques
  - Two lobe technique: Small or Non-existent median lobe
  - Three lobe technique: Large median lobe.

When not to do holep?

- Acutely tender prostate/sepsis/prostatic abscess
- Uncontrolled bleeding diathesis in very large gland

- Patient cannot be positioned in lithotomy position
- Patient unfit for regional anesthesia.

Learning Curve

- 30 patients are required for a urologist familiar with transurethral surgery to feel reasonably safe performing HoLEP.
- The learning curve for HoLEP is certainly shorter than that of laparoscopic procedures and TURP. For all urologists who manage to complete the learning curve, HoLEP has doubtless made TURP and open prostatectomy operations of the past.
- The most important pearl is to start for first 10 cases with glands under 40 grams.
- Once, the technique is mastered, then larger glands make sense and potential problems can be avoided altogether or easily addressed.

Tips and Tricks: HoLEP

- Enuceation
- Morcellation.

Step 1: Initial cystoscopic assessment and urethral calibration

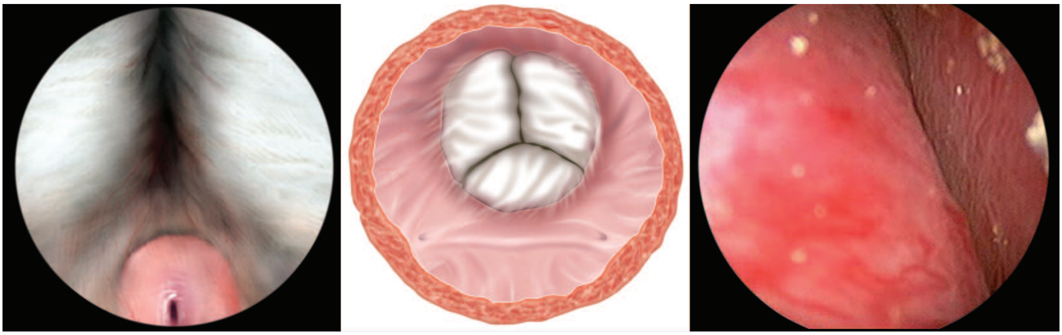


Figure 4.9: Cystoscopic assessment and urethral calibration

Step 2: 5 O'Clock and 7 O'Clock incision

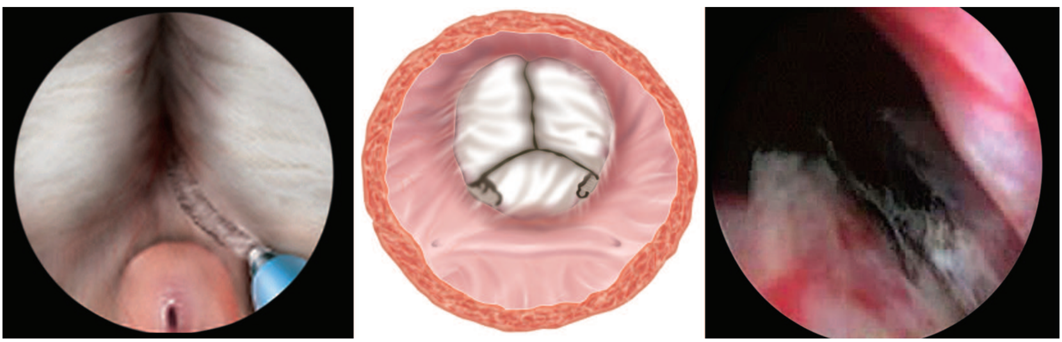


Figure 4.10: Make the incision wide and deep till the circular capsular fibers are clearly visible. Prostate tissue appear white "fluffy"

Step 3: Median Lobe Enucleation

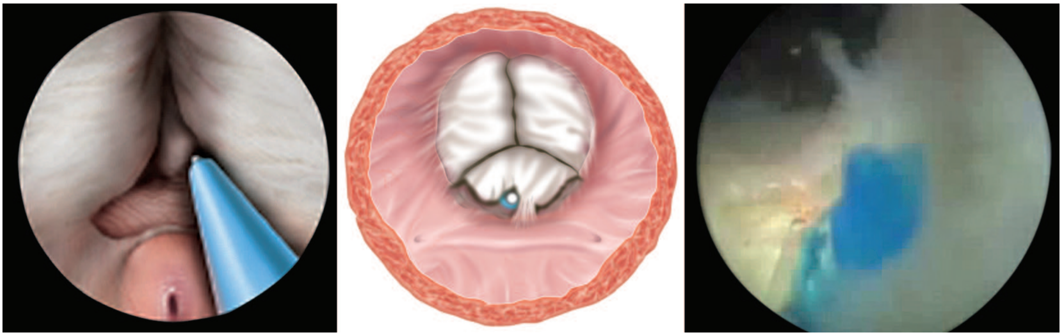


Figure 4.11: Avoid undermining trigone by repeated re-orientation with bladder neck. Avoid ureteric orifice injury by identifying them after initial 5 O'clock and 7 O'clock incision

Tips and Tricks: Median Lobe Enucleation

a. Going through the gland
b. Correct plane
c. Distal perforation
d. Undermining of trigone.

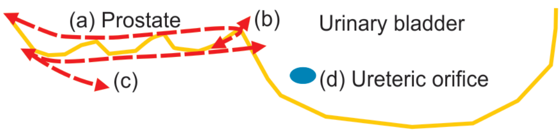


Figure 4.12: Tips and tricks for median lobe enucleation

Step 4: Apical Lobe Enucleation—Initial Incision

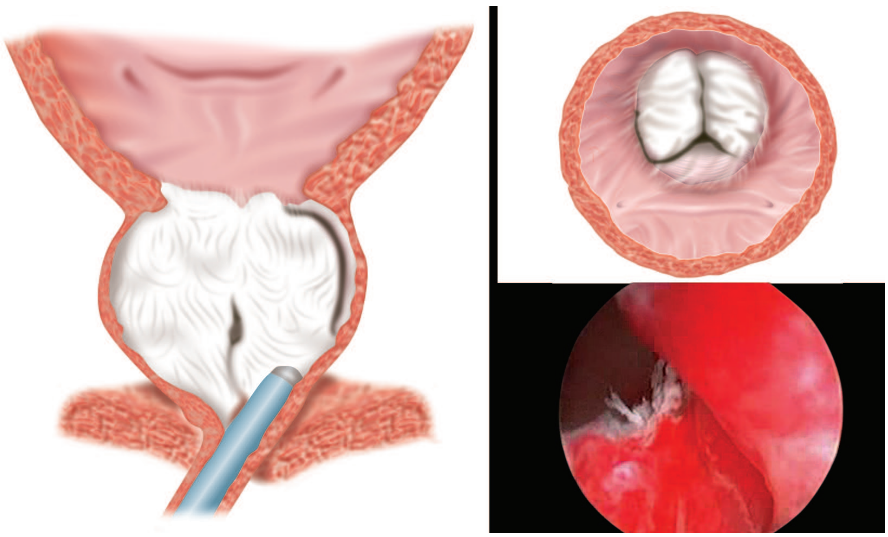


Figure 4.13: Do not hesitate in proceeding even if the adenoma is seen projecting distal to veru. Avoid cheating the apical tissue

Step 5: 12 O'Clock Incision

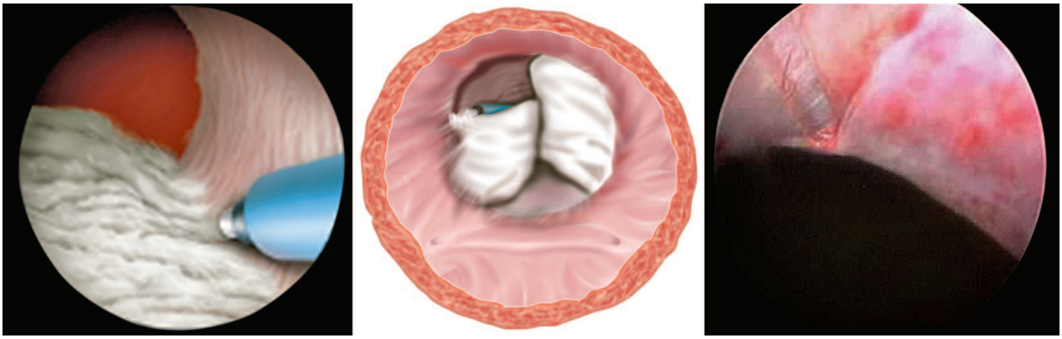


Figure 4.14: The length should be approx 3/4th distance between bladder neck and veru

Step 6: Lateral Lobe Enucleation

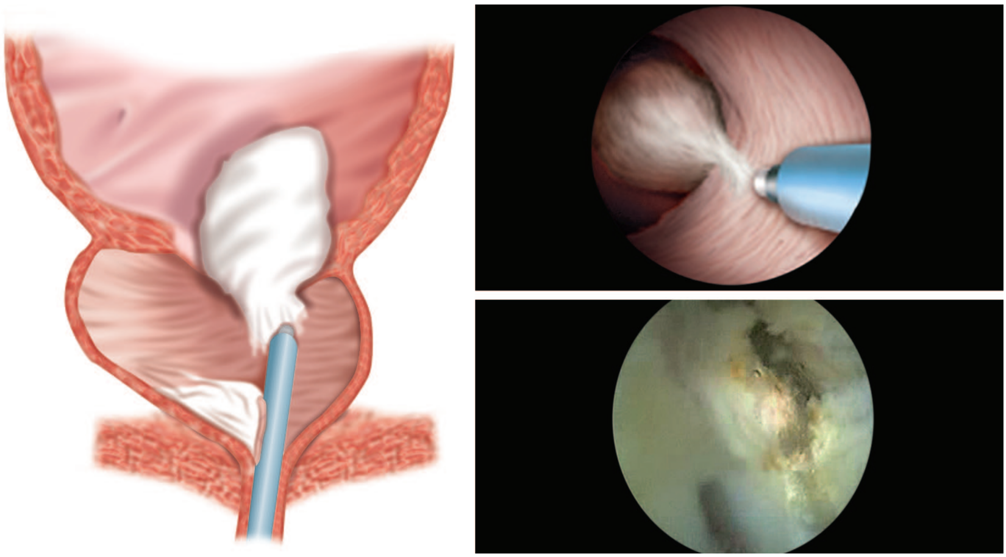


Figure 4.15: Stay on the capsule to avoid creation of 2 parallel incision which in-turn causes confusion and disorientation. Lost in prostate

Tips and Tricks

Difficulties faced by beginners

- Half hearted attempt with TURP at back of mind
- Poor vision as compared to TURP
- Fiber handling related problems
- Cutting here and there not remaining in plane

- Staying superficial in the adenoma (Cotton wool like appearance)
- Retraction of bleeders in partially resected adenoma and inability to coagulate the blood vessels.
- Fear complex of going deep or causing perforation
- Some bold operators may perforate in the beginning, thus inability to proceed further.
- Working in a deeper plane and opening up venous sinuses in the beginning. Causing fluid absorption and extravasation
- Difficulty in defining the apex and coming distal to veru to enucleate the apical tissue (fear complex)
- Not cutting the mucosa at apex anteriorly. Enucleated adenoma hangs at so formed pedicle, when a desperate attempt to detach this pedicle causes injury to sphincter.

Distal Perforation

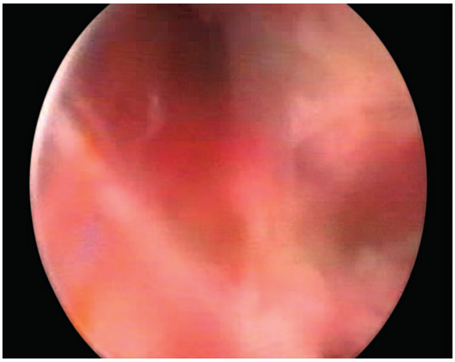


Figure 4.16: Distal perforation

Perforation—Mid Fossa

Figure 4.17: Perforation of mid fossa

Going Through Gland

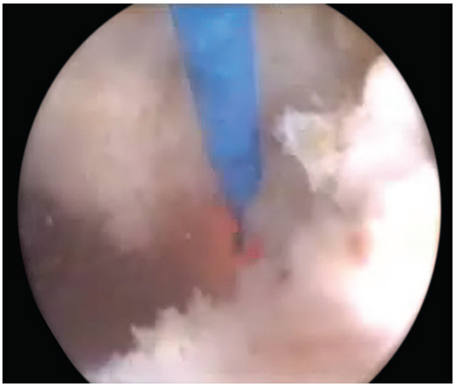


Figure 4.18: Perforation going through gland

Enucleation—Tips and Tricks

Problem–1

- Recalcitrant bleeding.

Solutions

- Reduce energy
- Defocussed beam
- Work in capsular plane
- Treating tissue around the site may be successful.

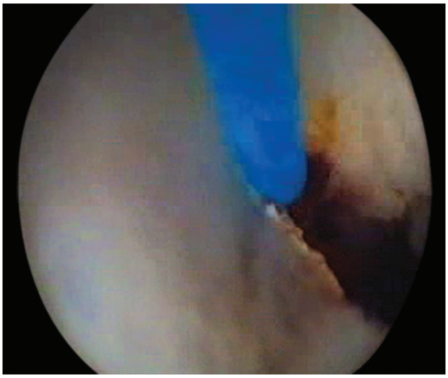


Figure 4.19: Enucleation in recalcitrant bleeding

Problem–2

- Venous bleeding.

Solutions

- Compress with the lifted lobe
- Work from other side
- If at the end of the procedure
- Leave it alone for gentle traction.

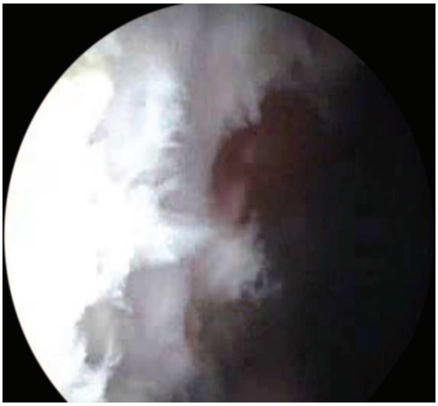


Figure 4.20: Enucleation in venous bleeding

Step 7: Final Appearance of Prostatic Fossa and Confirmation of Hemostasis

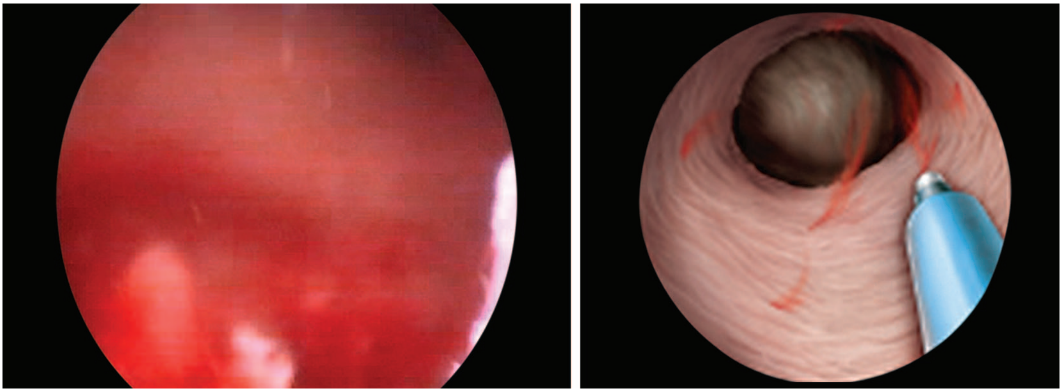


Figure 4.21: Final appearance of prostatic fossa and confirmation of hemostasis

Morcellation—Tips and Tricks

Problem–1

- Engagement of bladder mucosa inadvertently.

Solution
- Lift the lever of morcellator and gently pull the device free of mucosa.

Precaution
- Avoid chasing pieces.
- Allow lobe to come to morcellator and ensure that the bladder is full during morcellation.

Problems–2

- Inability to engage pieces into the morcellator.
- Small rounded pieces fail to engage.

Solutions
- Try to engage, if there is rough edge to the piece.
- If round in all directions, best to retrieve with a stone grasper or retrieval loop.
- TUR of floating lobes is another option.

IMMEDIATE POSTOPERATIVE CARE

- 20–22 French two/three way catheter inserted
- Intermittent bladder irrigation
- Lasix 20 mg IV usually given to eliminate saline absorbed during procedure

- Usually no postoperative blood-workup required
- Catheter can be removed the next morning and patient discharged within 36 hours.

HoLEP for Post-TURP Residual/Recurrent Symptomatic BPH

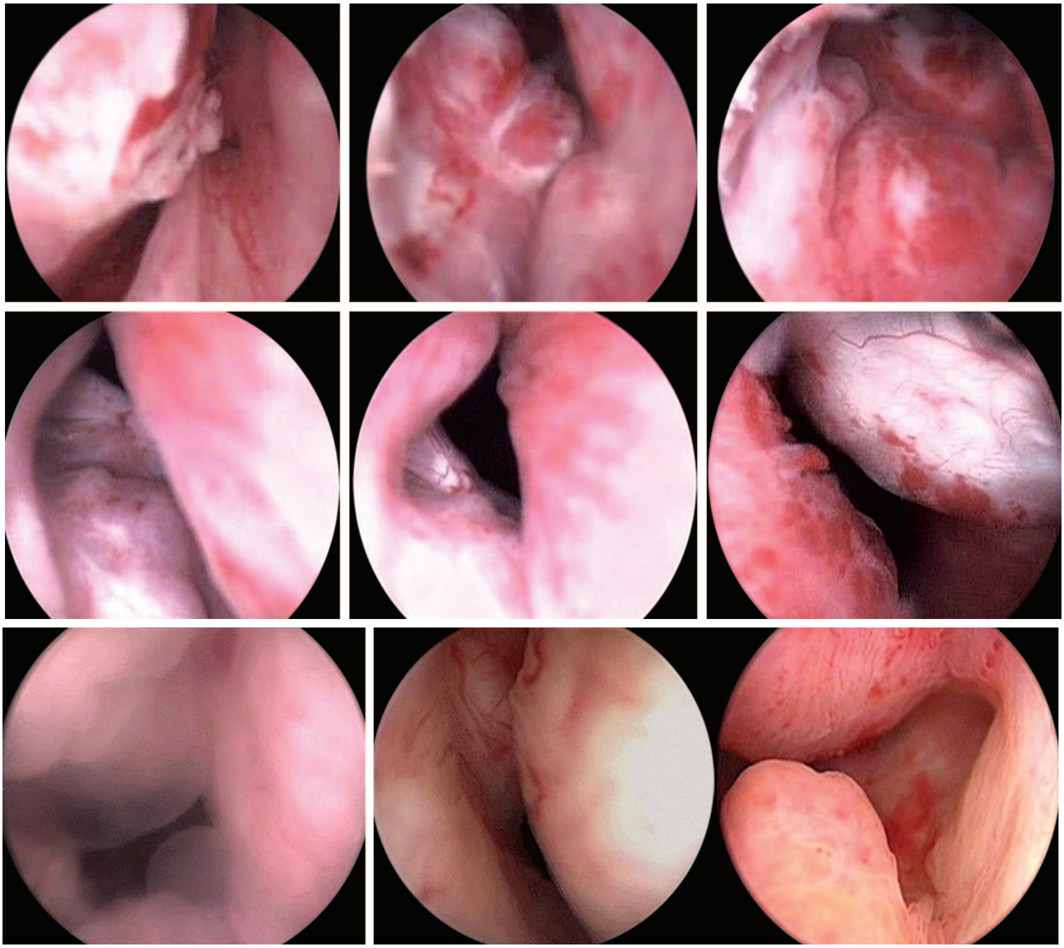


Figure 4.22: HoLEP for recurrent BPH after TURP

Energy Efficient Laser

- One can achieve precise dissection in the correct plane owing to pulsed nature.
- Other lasers are "trying to achieve" the correct plane.
- In the bargain:
  - At some places you leave charred tissue, which is responsible for irritative symptoms.

  - Where, on the capsule you are scared of cutting larger blood vessels (compared to holmium's dissecting capabilities where all vessels are nicely identified and coagulated).
- AUA – 2012 reports 22% incidence of erectile dysfunction following thulium laser.
- For similar reason, a higher incidence of bladder neck contractures is reported using other lasers.

Enucleation Challenges in Large Prostate

- Lifting a large prostate in midfossa.
- Difficulty in advancing because of shear weight and volume of adenoma.
- Solution: Release all distal connections early. Flip the lobe into bladder after reaching mid fossa.
- Difficulty in advancing on the floor if excessive anterior release in beginning.
- Difficulty to reach the roof if excessive dissection on the floor, because whole adenoma retracts towards roof, and in patients with tight suspensory ligaments, we cannot reach above the adenoma.
- Vascularity—Larger feeder vessels.
- Coagulate at low wattage (20 watts)
- Coagulate at base of vessel with defocused beam.
- Antegrade dissection in patients with inability to reach bladder neck due to long penis and tight suspensory ligament.

SUGGESTED READING

1. Kuntz RM. Current role of lasers in the treatment of benign prostatic hyperplasia (BPH). Eur Urol 2006;46:961–9.
2. Kuntz RM, Ahyai S, Lehrich K. Transurethral holmium laser enucleation of the prostate compared with transresical open prostatectomy: 3 years follow-up of a randomized trial. Proc SPIE. 2006;6078:11.
3. Lumenis Surgical Urology. 2000
4. PJ Gilling, et al. Jour of Endourology, 1996;9:151-3.

5

KTP Laser

• Shailesh Raina

- **Lasers in Urology**
  Potassium-Titanyl-Phosphate (KTP) and Holmium: Yttrium-Aluminum-Garnet (Ho:YAG) are the two primary lasers used in modern urology, addressing two of the most common urologic conditions, BPH and stones.
- **Types of Lasers**
  - Diode 980 nm (Evolve SLV)
  - Diode 830 nm (ILC, Indigo)
  - Nd:YAG (VLAP)
  - Holmium-YAG (HoLEP, HoLAP)
  - Potassium-Titanyl-Phosphate (KTP-Greenlight)
  - Thulium-YAG (Revolix).
- **Mechanism of Action—KTP**
  - Non-contact vaporization delivered by a continuous 532 nm KTP green laser beam.
  - Delivers uninterrupted heating and rapid vaporization of soft, vascular tissue, making it the tool of choice for the treatment of BPH.
  - The KTP wavelength is highly and selectively absorbed by hemoglobin but experiences virtually no absorption in water that limits penetration of the KTP laser beam to a depth of only 0.8 mm.
- Each of these modalities has their unique characteristics, with the mechanisms of removing the prostate ranging from tissue coagulation, vaporization, excision or a combination of these techniques.
- However, each technique is associated with disadvantages, which have prevented their acceptance as suitable alternatives to TURP.
- ND:YAG—postoperative dysuria and retention requiring recatheterization
- Diode laser—prolonged catheterization and dysuria.
- Ho:YAG—prolonged learning curve and longer operative time.
- The greenlight laser prostatectomy uses a KTP crystal to double the frequency of Nd:YAG laser, therefore, producing a laser with a 532 nm wavelength.
- Limited coagulation necrosis due to small optical penetration depth in tissue.
  - Energy is confined to the superficial layer of prostatic tissue that is vaporized rapidly and hemostatically with only a 1–2 rim of coagulation.
  - Has high photoselectivity for hemoglobin thus providing excellent hemostasis.

- In 2003, Malek et al presented their 5 years follow-up data with 80 watt KTP laser in patients.
  - Significant improvements had been achieved and sustained without deterioration during 5 years and with minimal complications.
- KTP laser photoselective vaporization of the prostate (PVP) offers rapid tissue ablation in patients with bladder outlet obstruction (BOO) caused by a large prostate.
  - Volumes greater than 60 mL (mean volume-103 g) and mean operative time was 101 min (range ± 37 min).
  - No blood transfusions or other complications noted.
- **Results**

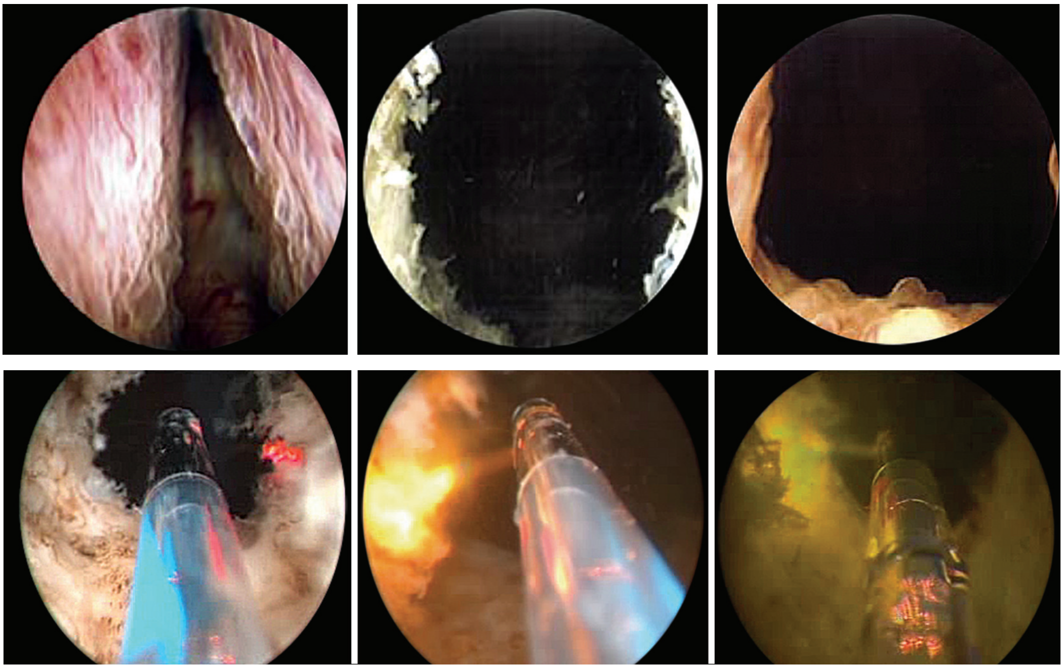


Figure 5.1:KTP laser in progress

- **Advantages**
  - Outpatient procedure for healthy patients
  - 14 hours mean catheterization time
  - Rapid flow rate improvement
  - Minimal side effects and quick return to normal activities.
  - Anticoagulated patients can be treated
  - Less than 1% reported erectile dysfunction.
- **Disadvantages**
  - No tissue for histopathology
  - Obligatory to rule out carcinoma prostate
  - Poor estimation of end point of surgery.

- **Contraindications**
  - Large medial lobe–difficult location of urethral obstruction
  - High PSA
  - Positive TRUS biopsy
  - Prostatic abscess
  - Fibrous gland
  - Significant prostatic calculi.
- **Complications**
  - Dysuria 30 (12%)
  - Recatheterization 18 (17.2%)
  - Hematuria 20 (8%)
  - Clot evacuation 2 (0.8%)
  - Stricture 6 (2.4%)
  - UTI 14 (5.6%)
- **Channel PVP**
  - For advanced prostate cancer in elderly gentlemen
  - Procedure similar to that for BPH
- **Problems with KTP**
  - Large medial lobe
  - Very large prostates
  - Fiber breakage
  - Prostatic calculi
  - Technical problems.
- The certainties of today are the problems of tomorrow
- Please use technology as walking stick and not as a pair of crutches.

6

Uroflowmetry and Multichannel Urodynamics in Male Lower Urinary Tract Symptoms

• Anita Patel

Following articles is an overview of utility of various urodynamic tests and their application in the evaluation of male LUTS.

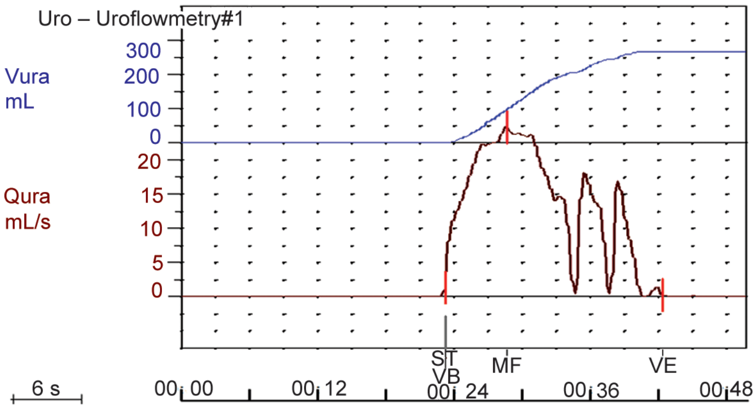
UROFLOWMETRY—IMPORTANT POINTS

- Minimum volume of 150 mL is necessary for correct interpretation.
- Patient should report a desire to void and should admit that the test matched his home performance.
- Voiding posture relevant especially in India as several men void in squatting position. Ideally the curve should be bell-shaped, the Qmax should be above 15 mL/sec.
- Test retest variation is known to occur.

This was a comparison of 10 home flowmetry readings with clinic flowmetry. Values most specific for identifying obstruction were mean Qmax of < 10 mL and sensitive for obstruction were a mean *Qmax* of >19 mL. Those <10 mL were most likely to need TURP! Those above 19 mL/sec were least likely to be associated with obstruction.

In this multicenter study, 1271 men, were evaluated with symptom score, voiding diary, UFR and pressure flow study. The aim was to show relation of *Qmax* and voided volume with presence of obstructive LUTS. Volume <150 mL and *Qmax* < 10 mL were most likely associated with bladder outlet obstruction (BOO).

Normal Flowmetry Graph



		Void begin	*Max flow*	*Void end*
Vura	mL	0	98	267
Qura	mL/s	1.5	25.0	0.5
Time		00:00:23:40	00:00:28:84	00:00:42:42

Max flow rate	25.0	mL/s
Voided volume	267	mL
Delay time	NA	s
Voiding time	19	s

Flow time	18	s
Average flow chart	14.9	mL/s
Time to max flow	5	s

Figure 6.1: A graph of normal flowmetry with terminal interrupted flow possibly due to straining

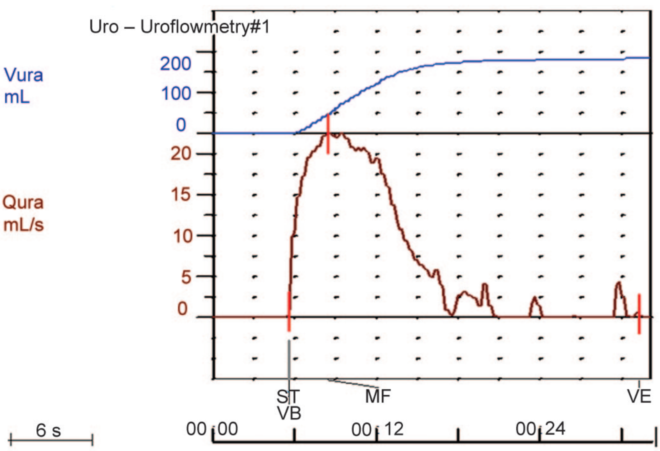
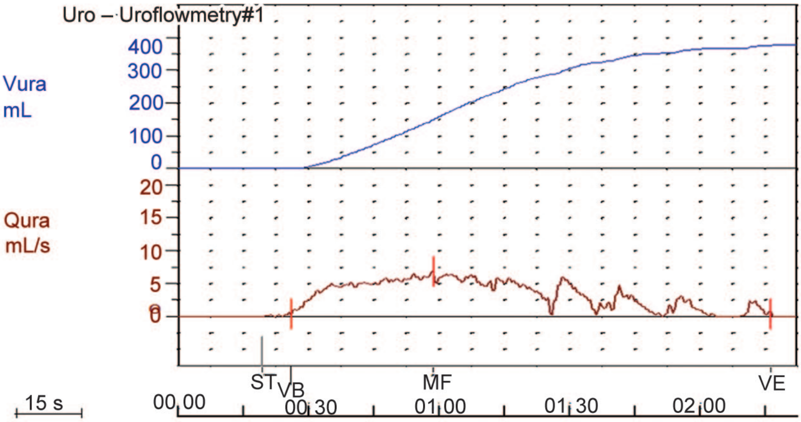


Figure 6.2: Another bell-shaped normal flow with voided volume of 185 mL/s, Qmax of 22.5 mL/sec and terminal post-micturition dribble

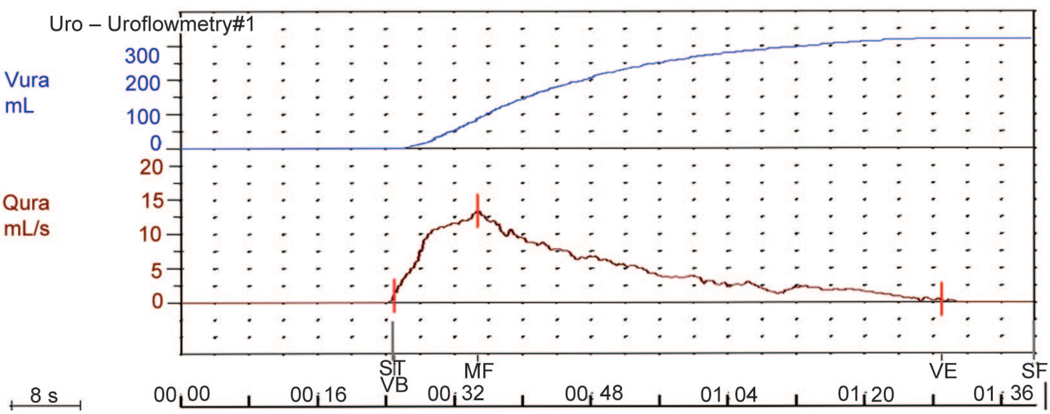
Normal Volume Slow Flow, Bell-shaped Curve



Flow time	95	s	Max flow rate	6.9	mL/s
Average flow rate	4.0	mL/s	Voided volume	377	mL
Time to max flow	33	s	Delay time	NA	s
			Voiding time	110	s

		Void begin	*Max flow*	*Void end*
Vura	mL	0	150	377
Qura	mL/s	0.5	6.9	0.5
Time		00:00:26:12	00:00:59:04	00:02:16:54

Figure 6.3: Flowmetry graph in a 68-year-old male with mainly voiding symptoms. No treatment given so far. Sonography shows 20% residue. No comorbidities. Note prolonged void time, slow Q max

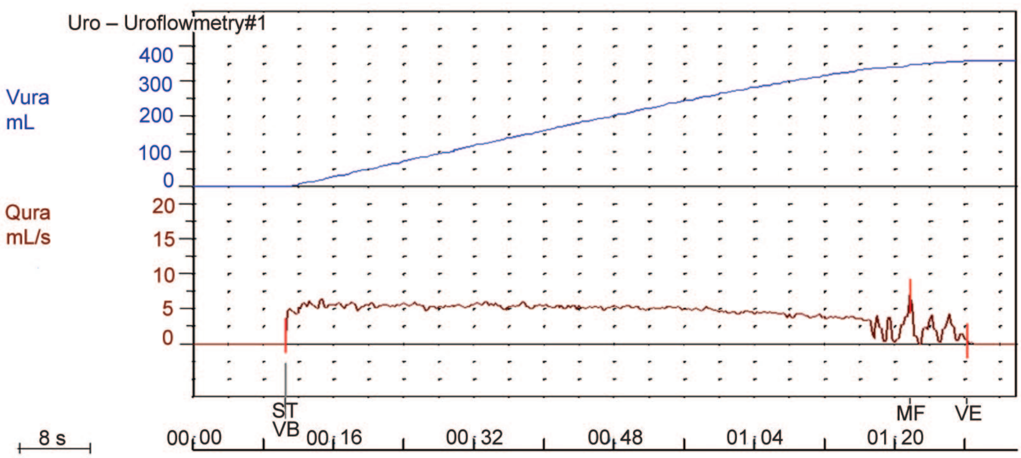


Flow time	62	s	Max flow rate	13.5	mL/s
Average flow rate	5.2	mL/s	Voided volume	320	mL
Time to max flow	10	s	Delay time	NA	s
			Voiding time	64	s

		Void begin	*Max flow*	*Void end*
Vura	mL	0	85	320
Qura	mL/s	1.1	13.5	0.5
Time		00:00:25:24	00:00:34:76	00:01:25:00

Figure 6.4: Same patients after 3 months of alpha blockers. Patient has much lower bother factor now with subjective and objective improvement

Normal Volume Flat Curve

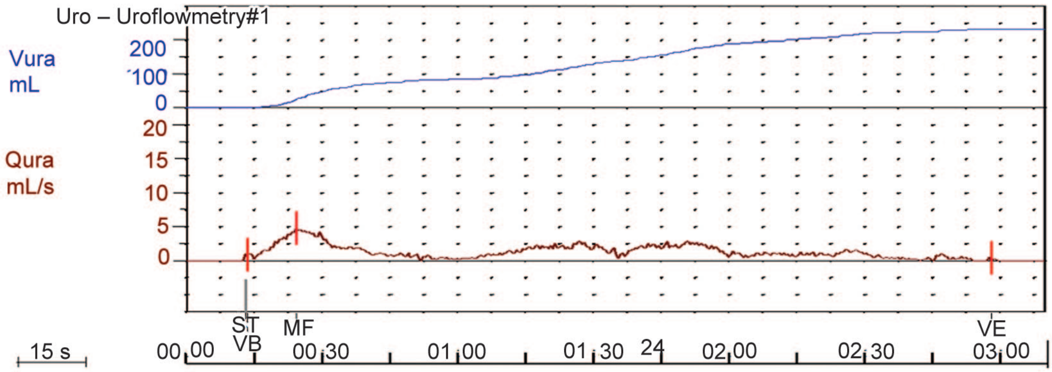


Flow time	76	s	Max flow rate	7.0	mL/s
Average flow rate	4.7	mL/s	Voided volume	360	mL
Time to max flow	71	s	Delay time	NA	s
			Voiding time	78	s

		Void begin	*Max flow*	*Void end*
Vura	mL	0	347	360
Qura	mL/s	1.3	7.0	0.5
Time		00:00:10:74	00:01:21:88	00:01:28:40

Figure 6.5: A 70-year-old male, h/o TURP 1 year back. Had short-term improvement but has voiding trouble again. Patient sent for flowmetry. He has 25% residue. Note flat curve with slow Q max and prolonged void time. Almost certainly he has a bladder neck stenosis or urethral stricutre

Normal Volume Wavy Flow



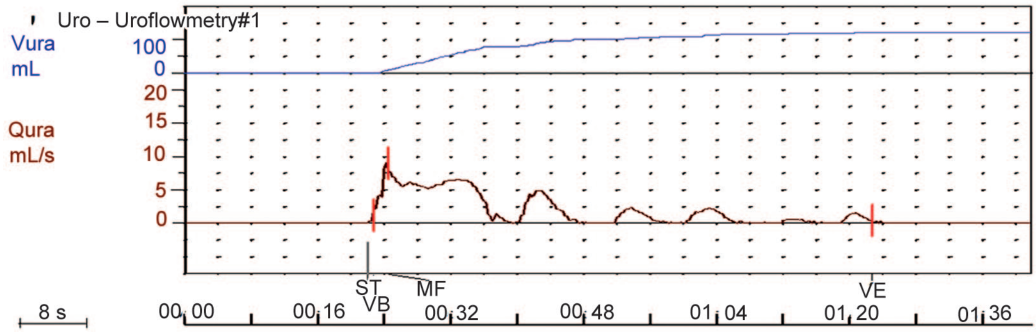
Flow time	134	s
Average flow rate	1.7	mL/s
Time to max flow	11	s

Max flow rate	4.9	mL/s
Voided volume	232	mL
Delay time	NA	s
Voiding time	164	s

		Void begin	*Max flow*	*Void end*
Vura	mL	0	25	232
Qura	mL/s	1.0	4.9	0.5
Time		00:00:13:68	00:00:24:54	00:02:58:16

Figure 6.6: A 78-year-old, diabetic, slow flow, occasional enuresis. Sonography shows with large residue, bilateral mildly dilated upper tracts. Flow pattern suggestive of under active detrusor

Wavy Flow Continued



Flow time	36	s	Max flow rate	9.1	mL/s
Average flow rate	3.4	mL/s	Voided volume	124	mL
Time to max flow	2	s	Delay time	NA	s
			Voiding time	60	s

		Void begin	*Max flow*	*Void end*
Vura	mL	0	9	124
Qura	mL/s	1.3	9.1	0.5
Time		00:00:22:76	00:00:24:60	00:01:22:84

Figure 6.7: An 82-year-old man with straining at urination, diurnal frequency and 100 mL/s residue for above voided volume. Non-diabetic. Note slow wavy flow. Most likely cause is age induced under active detrusor

Interrupted Flow

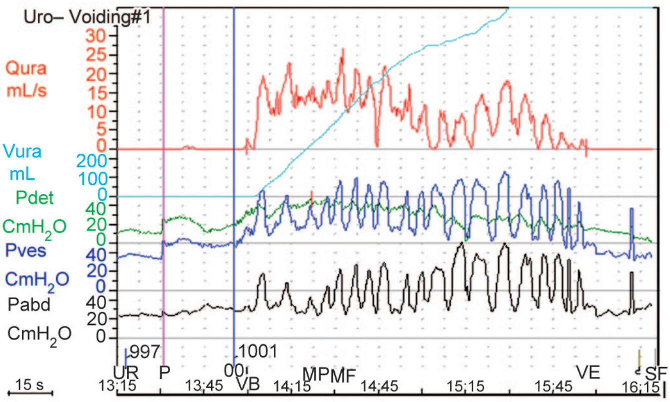
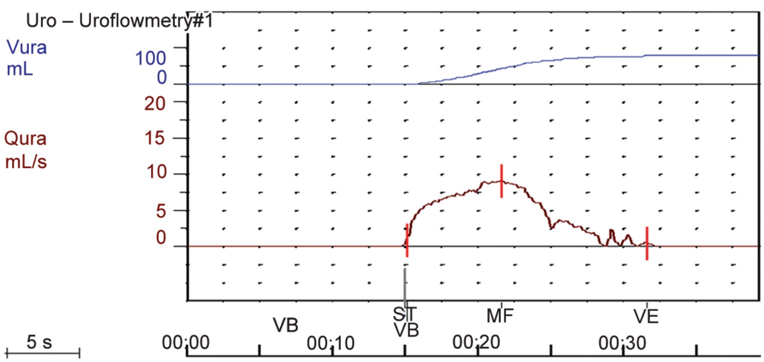


Figure 6.8: A 60-year-old male with interrupted flow, diurnal frequency. He is on antidepressants including lithium. There is a post-void residue of 500 mL/s after voiding 1100 mL/s. Above graph is a pressure flow study showing low pressure detrusor with severe straining with intermittency

Persistent Small Volume Flow

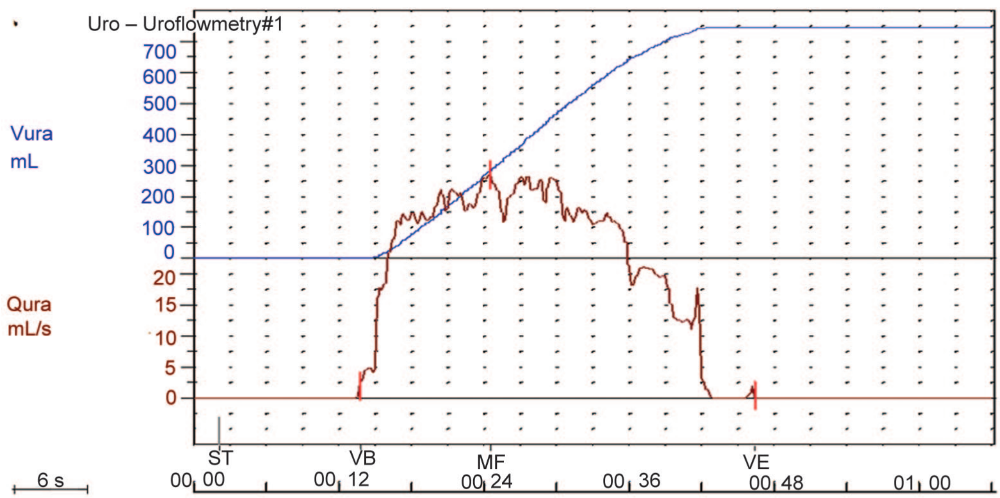


Flow time	15	s	Max flow rate	9.2	mL/s
Average flow rate	5.3	mL/s	Voided volume	79	mL
Time to max flow	7	s	Delay time	NA	s
			Voiding time	17	s

		Void begin	*Max flow*	*Void end*
Vura	mL	0	44	79
Qura	mL/s	1.0	9.2	0.5
Time		00:00:15:22	00:00:21:76	00:00:31:76

Figure 6.9: A 72-year-old male, mainly storage symptoms with night frequency of 5 times. Sonography shows full bladder volume of 130 mL/s, UFR as above. This was his 3rd flowmetry with identical results. Voiding diary not kept

Large Volume Fast Flow



Flow time	29	s	Max flow rate	36.1	mL/s
Average flow rate	25.3	mL/s	Voided volume	745	mL
Time to max flow	11	s	Delay time	NA	s
			Voiding time	33	s

		Void begin	*Max flow*	*Void End*
Vura	mL	0	284	745
Qura	mL/s	2.0	36.1	0.5
Time		00:00:13:94	00:00:24:64	00:00:46:56

Figure 6.10: A 55-year-old, health conscious man, c/o severe day time urinary frequency. No comorbidities. Pathology normal. Sonography shows complete emptying with normal upper tract

MULTICHANNEL URODYNAMICS AND MALE LUTS

This usually refers to simultaneous measurement of detrusor pressure and flow ± electromyelogram (EMG). A video is useful, if a primary bowel neck obstruction (BNO) is suspected in a relatively young male or pelvic floor dysfunction is suspected. EMG is ideally done with a concentric needle electrode. However, this can be uncomfortable for a neurologically normal patient and instead adhesive electrodes can be used. These, however, pick up overall pelvic floor activity. In practice, most of the diagnoses can be made with a well conducted pressure flow study.

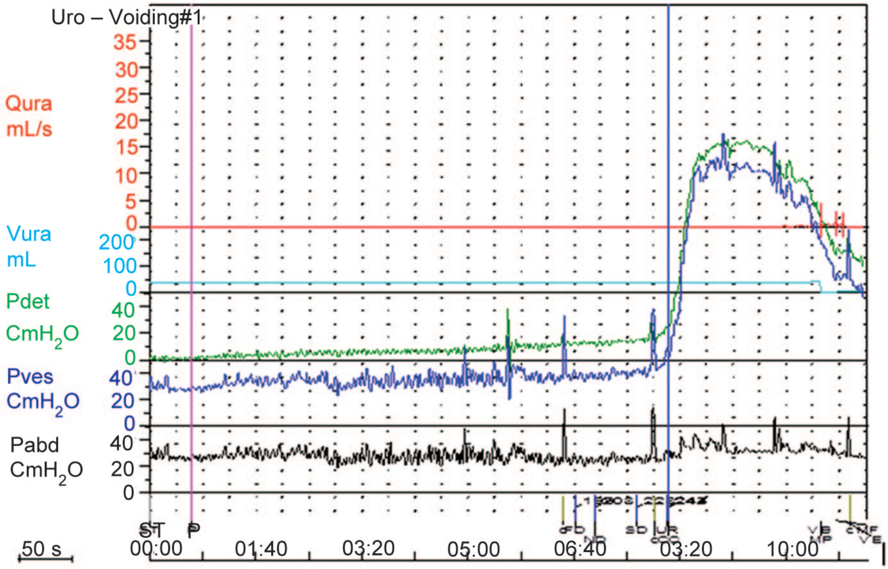


Figure 6.11: A 68-year-old man, h/o retention with overflow, on indwelling catheter since 1 month. Catheter free trial failed. No comorbidities. Imaging – Endovesical middle lobe. Pressure flow graph above shows classic obstructed void with high pressure, slow flow and large residue

Pressure Flow Study

Pressure Flow Study in BOO

AG number—The Abrams-Griffiths number is also known as bladder outlet obstruction index (BOOI) and is represented by the equation: BOOI = Pdet @ Qmax − 2 Qmax. BOOI > 40 = obstructed; BOOI 20−40 = equivocal; and BOOI < 20 = unobstructed. For purposes of standardization, this nomogram is now recommended for use in older men with LUTS suggestive of BPO.

Schaefer's nomogram—An index for bladder contractility can be calculated from the contractility groups derived from the Schaefer nomogram. The bladder contractility index (BCI) is represented by the following formula:

$$\text{BCI} = \text{Pdet Qmax} + 5\ \text{Qmax}.$$

Using this formula, contractility can be divided into strong > 150, normal 100–150, and weak < 100.

Chronic Retention of Urine

Patients with voiding symptoms, known to have BPH, having a large post-void residue; need not have pressure flow study prior to surgical interference. Also an index patient with significant history of voiding symptoms, presenting with retention and dilated upper tracts ± raised creatinine is very likely to be obstructed. However in practice today, defensive medicine forces use to have UDS in these cases. On the other hand, those asymptomatic patients with large volume painless residue are best evaluated with UDS. They are likely to have low pressure, flabby bladder with less chance of obstruction. A urodynamic test here will improve treatment outcome.

In a study of 50 cases, patients were randomized to ISC or catheterization. All were offered a TURP eventually. All had pressure flow study. Those with dilated upper tracts, raised creatinine had better outcome post-operative than those with low pressure bladder. Those on ISC were evaluated again after 6 months to select patients for TURP if the bladder function had recovered. Waiting for that period did not have any positive impact on detrusor behavior.

Poor Compliance in Chronic Retention

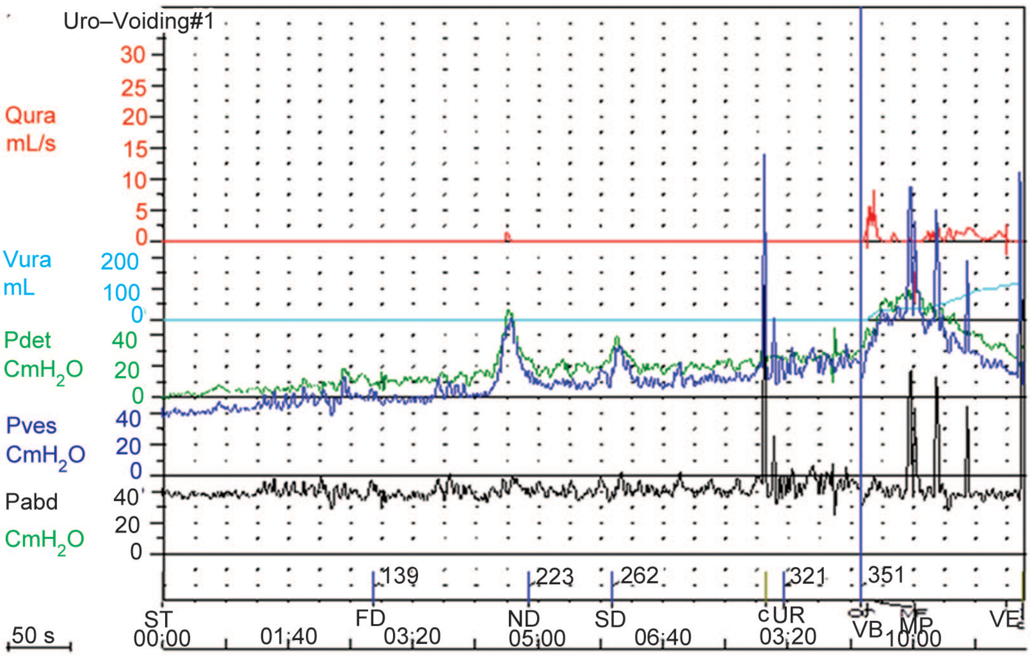


Figure 6.12: A typical pressure flow showing low pressure over activity, urge leak reduced compliance with low pressure slow flow and large residue

Poor Compliance—Chronic Retention, Detrusor Overactivity with Obstruction

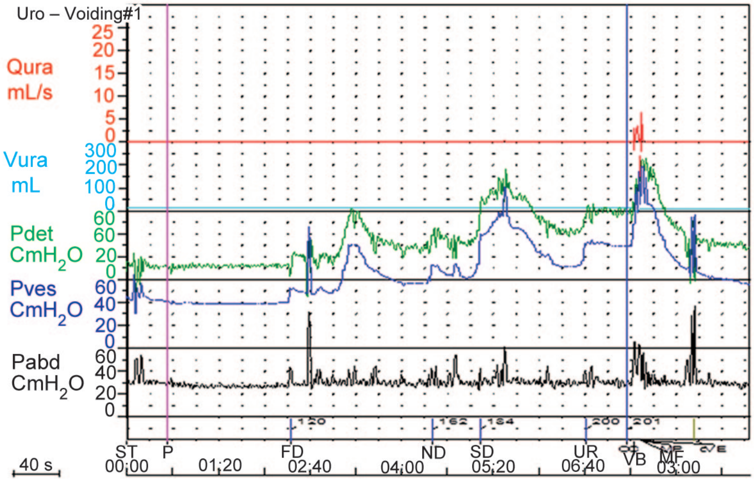


Figure 6.13: A-65-year-old man, h/o voiding symptoms in the past, with chronic retention. Creatinine is 3 mg%, with dilated upper tracts. Urodynamic test done 6 weeks post-decompression. Note poor comliance, over activity and high pressure slow flow incomplete void

Dyssynergic Sphincter

Dyssynergic sphincter is typically seen in a neurogenic scenario with stroke being the commonest cause in this age group. Parkinsonism patients have show relaxation of sphincter. Diabetics usually have detrusor under or over activity rather than sphincteric dysfunction. Multiple sclerosis is another rare group where dyssynergic sphincter is seen.

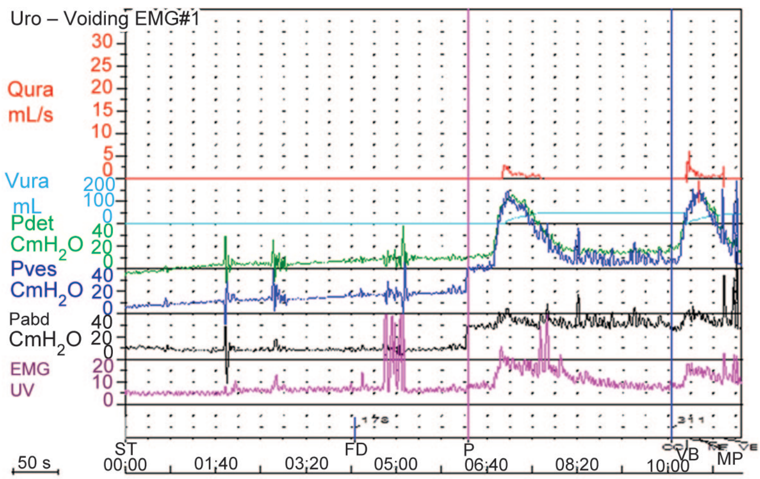


Figure 6.14: A 71-year-old, hypertensive, h/o stroke twice, presently right hemi; dependent for most activities. Presented with retention, sonography shows endovesical middle lobe. Urodynamic test shows overactivity, urge leak with DESD. Clearly a poor candidate for intervention

Detrusor Overactivity and BOO

Presence of overactivity does not mean obstruction but it may reflect an age-related phenomenon. Imaging in these cases shows detrusor thickening on sonography and a scopy may show presence of trabeculations. It simply indicates excessive work being done by the detrusor muscle. A fair number of obstructed patients will also show these features.

In a study of 1418 men, evaluated with urodynamics, (median age: 63 year); 864 men (60.9%) had detrusor overactivity. In univariate analysis, men with detrusor overactivity were significantly older, more obstructed, had larger prostates, higher irritative IPSS, a lower voiding volume at free uroflowmetry, and a lower bladder capacity. Multivariate analysis showed that only age and bladder outlet obstruction grade were independently associated with detrusor overactivity.

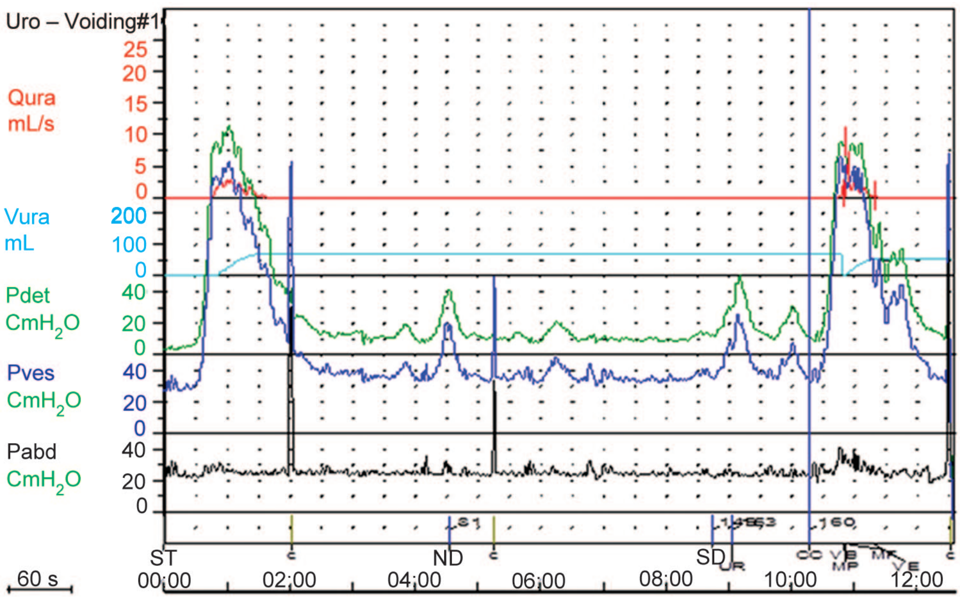


Figure 6.15: Patient had chronic retention, overflow incontinence one month back; since then on catheter. He had significant storage and voiding symptoms. Motion was normal. Nondiabetic and normotensive. Creatinine was 2.2 at the time of retention. Sonography reveals prostatic enlargement, bilateral dilated upper tracts. Examination—Very fit man of 78 years, neurologically normal. PR—Normal sphincter, moderate BPH. Above graph shows initial overactivity with features of obstruction. PQ plot shows excellent contractility

In another *study,* 30% men out of 50 had persistent detrusor overactivity 1 year after TURP. These were found to have high resistance to blood flow in the detrusor muscle.

Underactive Detrusor

Detrusor underactivity is urodynamically defined as lower levels of maximum possible detrusor contraction velocity and/or iso-volumetric detrusor pressure than the 25th percentiles of such parameters in controls.

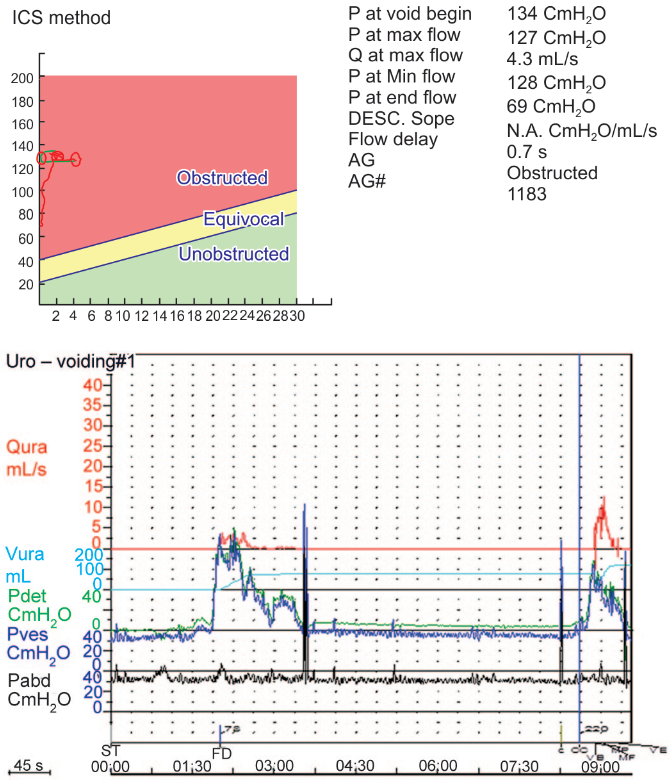


Figure 6.16: IDDM, 70-year-old man, storage symptoms with urge leak. No PVR on sonography. Mildly enlarged prostate clinically. On alpha blockers since 5 years. Pressure flow shows over activity with urge leak and equivocal voiding pressure, supported by the PQ plot below

Repeat pressure flow study done in 196 patients after a minimum gap of 10 years in men with proven underactive detrusor, irrespective of if they underwent a TURP. The conclusion was—"There is no evidence to suggest that detrusor contractility declines with long-term BOO. Relieving the obstruction surgically does not improve the contractility but simply improves the emptying by lowering the outlet resistance. This is important when considering and counseling for TURP. Underactive detrusors remain underactive, but do not get worse with time, which could indicate that this is not an aging process per se and may even have a congenital basis".

In another study, with 92 patients the preoperative urodynamics showed that 60%, 40% and 48% of patients showed BOO, DUA and DO, respectively. After TURP, 76% showed 'excellent' or 'good' overall efficacy, whereas only 13% fell into the 'poor/worse' category. The efficacy was higher as the preoperative degree of BOO worsened. In contrast, neither DO nor DUA influenced the outcome of TURP. However, the surgery likely provided unfavorable efficacy for patients having DO but not BOO. Only 20% of the patients who had both DO and DUA but did not have BOO achieved efficacy.

The conclusion were: Transurethral resection of the prostate is an effective surgical procedure for treatment of LUTS/BPH, especially for patients with BOO. DUA may not be a

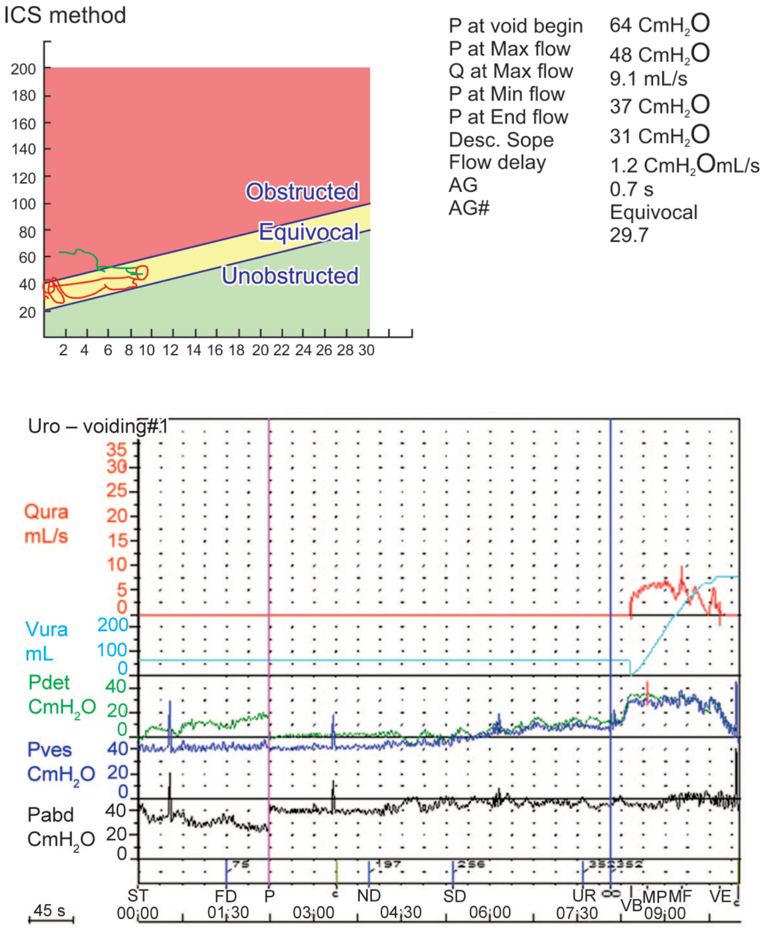


Figure 6.17: A pressure flow trace in an 80-year-old male with voiding symptoms. Note that P det barely touches 40 cm, with slow flow but complete emptying

contraindication for TURP. The surgical indication should be circumspect for patients who do not have BOO but have DO.

A study with a 12 years long-term follow-up of 47 patients undergoing TURP showed—"Although the improved IPSS and QOL index at 3 month gradually deteriorated with time, patients at 12 years were still significantly better than those at baseline. The IPSS in patients without BOO deteriorated faster than in those with it, whereas neither DUA nor DO influenced the slope of change in IPSS. Regardless of the preoperative urodynamic findings, the QoL index remained improved for 12 years. Two-thirds of patients with DUA but not BOO were satisfied with their urinary condition at 12 years."

Acontractile Detrusor

True acontractile detrusor is difficult to prove in a neurologically intact patient. Often this conclusion is drawn when the patient does not void.

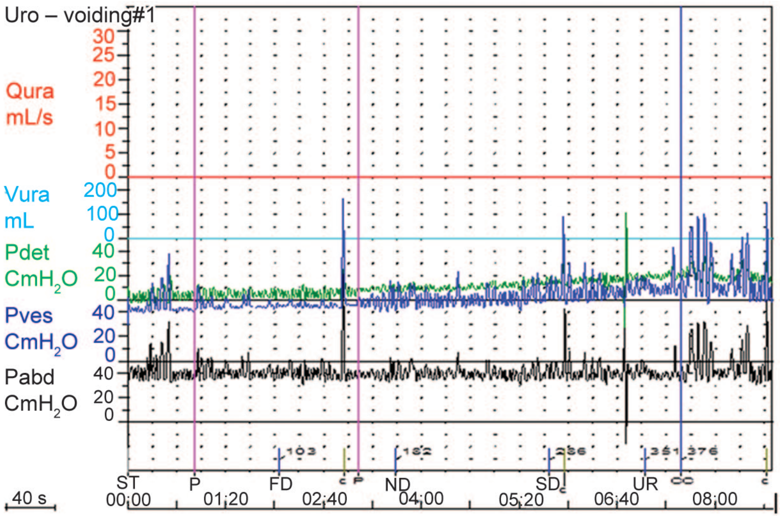


Figure 6.18: The patient did not void during a pressure flow study. It would be erroneous to call this an underactive detrusor

GUIDELINES

In today's era of evidence based medicine, any study should be conducted in accordance with guidelines laid down by internationally reputed and recognized bodies. This not only brings uniformity in conducting and analyzing any scientific work but also gives a common scientific language, worldwide for data collection. Following terminologies are used in the nomenclature of such guidelines.

- **Standard:** A guideline statement is a standard if: (1) the health outcomes of the alternative interventions are sufficiently well known to permit meaningful decisions and (2) there is virtual unanimity about which intervention is preferred.
- **Recommendation**: A guideline statement is a recommendation if: (1) the health outcomes of the alternative intervention are sufficiently well known to permit meaningful decisions, and (2) an appreciable but not unanimous majority agrees on which intervention is preferred.
- **Option:** A guideline statement is an option if: (1) the health outcomes of the interventions are not sufficiently well known to permit meaningful decisions, or (2) preferences are unknown or equivocal. Options can exist because of insufficient evidence or because patient preferences are divided and may/should influence choices made.

EAU, NICE [UK] and AUA guidelines are evidence based and make a recommendation for flowmetry in all men with LUTS but keep pressure flow study as an option for selected population as above.

Based on the above text, following conclusion can be drawn:

CONCLUSION

1. UFR

- Simple noninvasive test with easy reproducibility

- One test, which every urologist must have in his clinic, primarily to exclude several other conditions rather than to diagnose a particular cause. It certainly helps in documenting slow flow on paper.
- Has no relevance in isolation unless symptoms, post-void residue and when applicable, a bladder diary is taken into consideration.

AUA guidelines—Assessment of flowmetry is recommended for mainly voiding LUTS.

EAU guidelines—Assessment of male LUTS recommends checking flowmetry.

After clinical examination, IPSS, urine analysis, sonography (May 2012).

NICE guidelines—Flowmetry is recommended if a male patient with LUTS does not respond to simple treatment such as lifestyle changes, etc. and needs specialized evaluation.

2. Invasive UDS

- Optional test.
- Use it judiciously. Benign prostatic obstruction (BPO) and detrusor overactivity or under-activity are urodynamic diagnoses. Filling cystometry and pressure-flow measurement are optional tests, usually indicated before surgical treatment in men who:
  1. Cannot void > 150 mL;
  2. Have a maximum flow rate > 15 mL/s;
  3. Are < 50 or > 80 years of age;
  4. Can void but have post-void residual urine > 300 mL;
  5. Are suspicious of having neurogenic bladder dysfunction (stroke, diabetes, Parkinsonism)
  6. Have bilateral hydronephrosis;
  7. Had radical pelvic surgery or;
  8. Hadfs previous unsuccessful (invasive) treatment.

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2. Al-Hayek S, Thomas A, Abrams P. Natural history of detrusor contractility—minimum ten-year urodynamic follow-up in men with bladder outlet obstruction and those with detrusor under activity. Bristol Urological Institute. Southmead Hospital, Bristol, UK. Scandinavian Journal of Urology Nephrology Suppl. 2004;(215):101-8
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4. EAU guidelines, AUA guidelines, NICE guidelines.
5. Ghalayini IF, Al-Ghazo MA, Pickard RS. A prospective randomized trial comparing transurethral prostatic resection and clean intermittent self-catheterization in men with chronic urinary retention. BJUI 2005:96(1):93-7.
6. Masumori N, Furuya R, Tanaka Y, Furuya S, Ogura H, Tsukamoto T. The 12-year symptomatic outcome of transurethral resection of the prostate for patients with lower urinary tract symptoms suggestive of benign prostatic obstruction compared to the urodynamic findings before surgery. BJUI. 2010;105(10):1429-33. Epub 2009; Oct 26.

7. Mitterberger M, Pallwein L, et al. Persistent detrusor overactivity after transurethral resection of the prostate is associated with reduced perfusion of the urinary bladder. Innsbruck Medical University, Austria. BJUI. 2007; 99(4):831-5. Epub 2007 Jan 22.
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9. Tanaka Y, Masumori N, Ito N, Furuya S, Ogura H, Tsukamoto T. Is the short-term outcome of transurethral resection of the prostate affected by preoperative degree of bladder outlet obstruction, status of detrusor contractility or detrusor overactivity? Int Jour Urol. 2006;13(11):1398-404.

7

Open Prostatectomy—Where do We Stand?

• RM Meyappan • SD Bapat

- 1895, Eugene Fuller – First performed transvesical prostatectomy.

- 1900, Peter Freyer – Popularized transvesical prostatectomy.

- 1932, Stern and McCarthy – TURP.

- 1946, Terrence Millin, Retropubic prostatectomy.

RISE OF TRANSURETHRAL RESECTION OF THE PROSTATE

- Open prostatectomy was gold standard for 50 years
- More complication rate
- More due to older anesthetic regimens and blood transfusion protocols
- Morbidity of present series of open prostatectomies significantly lesser than in the 1960s.

Freyer's Prostatectomy

- Large median lobe protruding into the bladder
- Clinically significant bladder diverticulum
- Large bladder calculi.

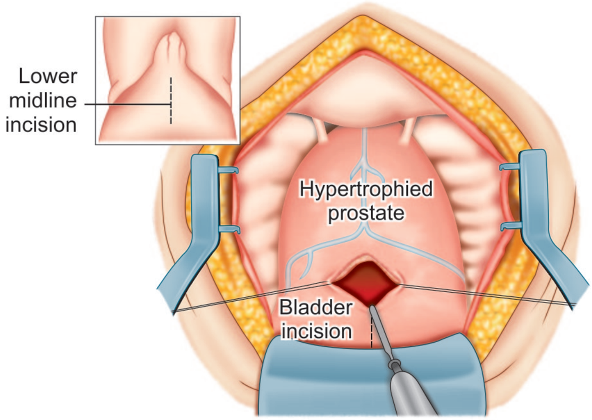

Figure 7.1: Bladder incision

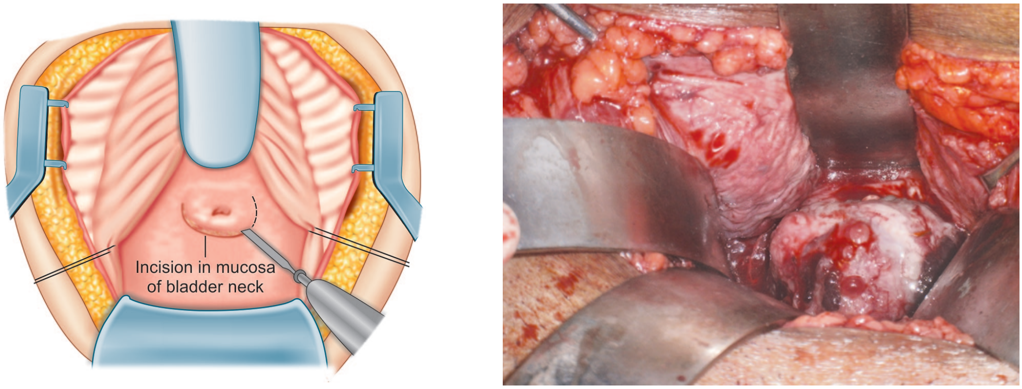

Figure 7.2: Incision in bladder neck

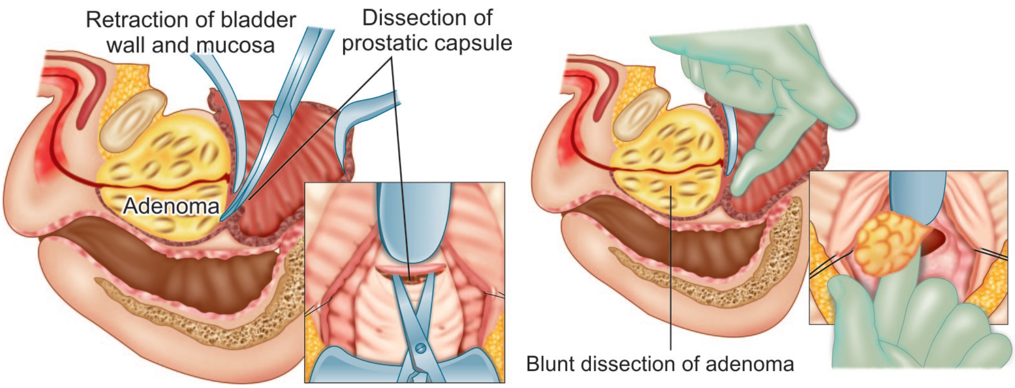

Figure 7.3: Dissection and finger enucleation

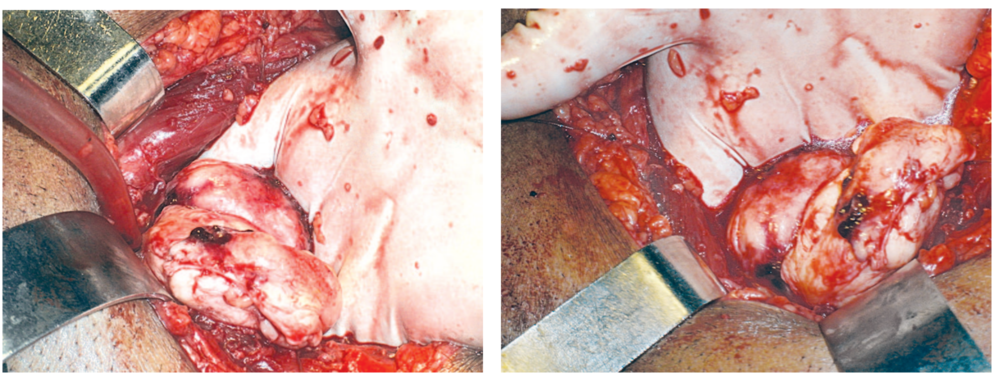

Figure 7.4: Gland delivery

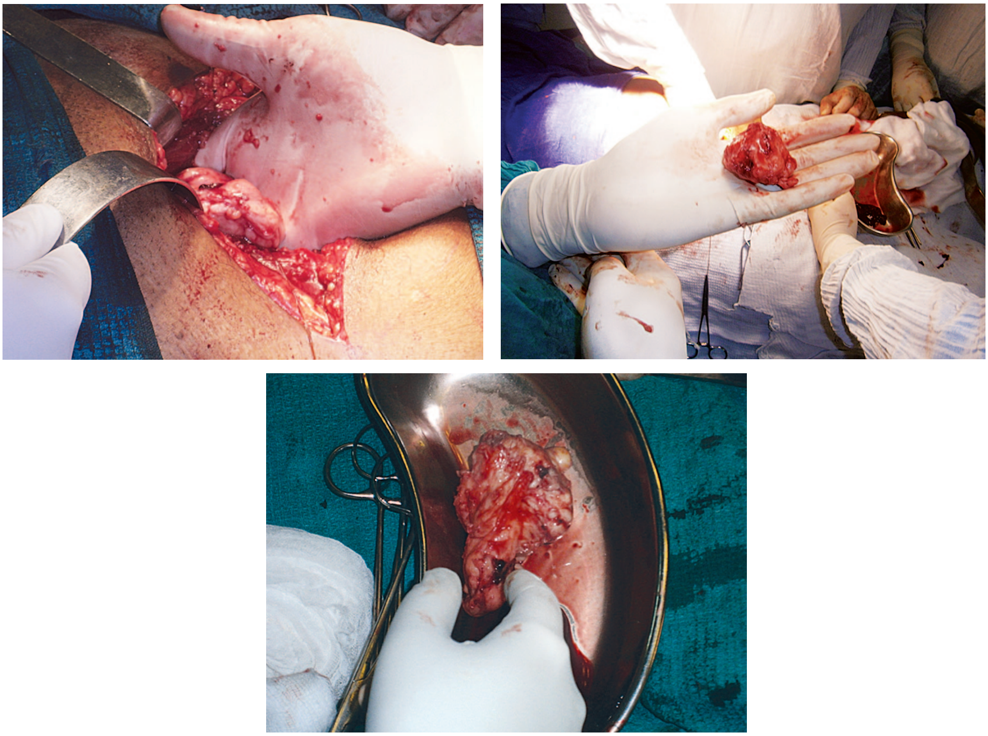

Figure 7.5: Adenoma delivered out

Hemostasis

- Purse string partition closure (Malament).

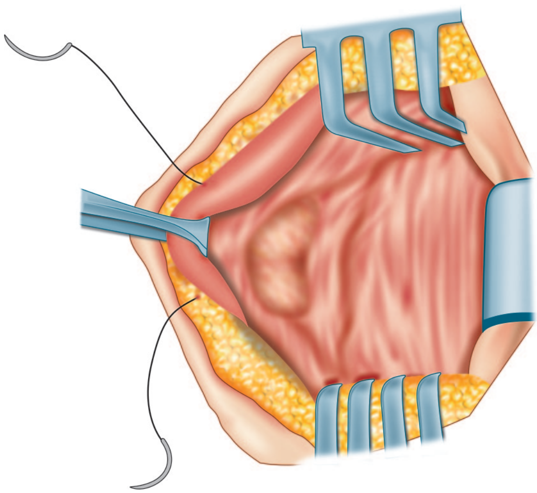

Figure 7.6: Malament closure

Capsular Plication (O'Connor)

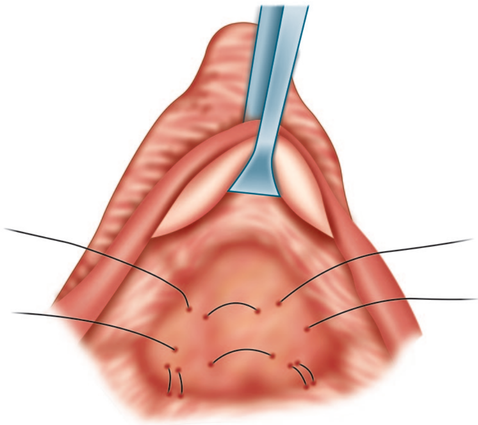

Figure 7.7: Capsular plication

Millin's Prostatectomy

- Excellent anatomic exposure
- Direct visualization – ensure complete removal
- Precise transection of urethra; preserve sphincter
- Clear visualization of fossa for control of bleeding
- Minimal or no surgical trauma to bladder.

INDICATIONS FOR OPEN PROSTATECTOMY

Estimated adenoma size > 75 g
- Significant bladder diverticula
- Large bladder calculi

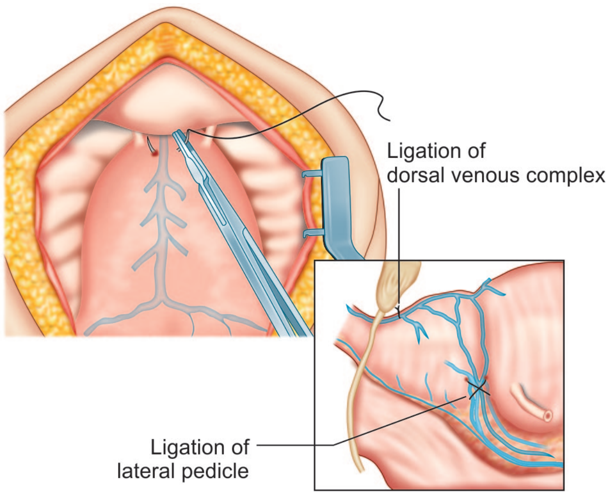

Figure 7.8: Vessel ligation

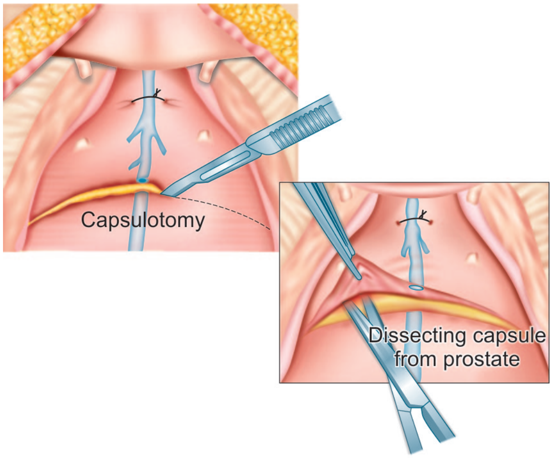

Figure 7.9: Capsulotomy and capsular dissection

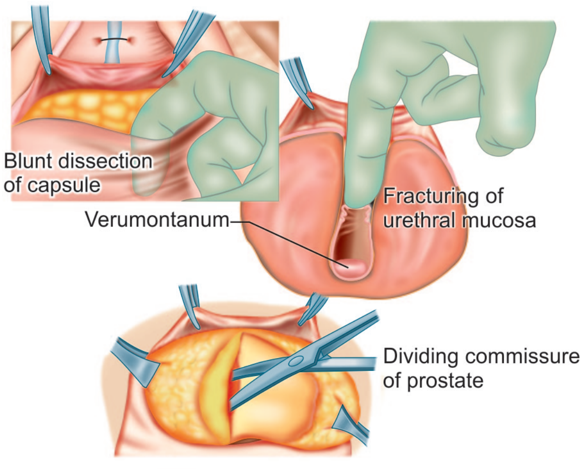

Figure 7.10: Dividing commisure of prostate

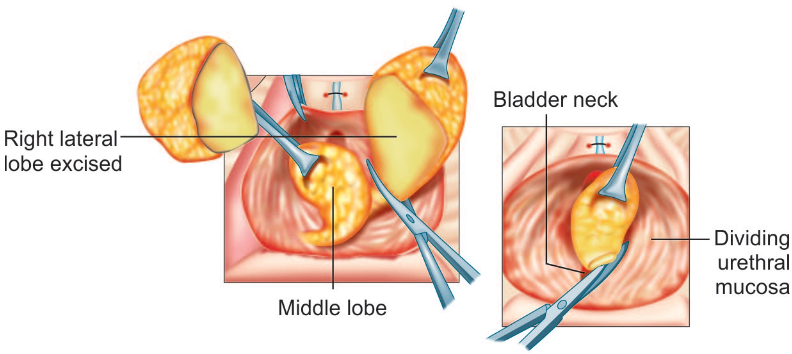

Figure 7.11: Prostatic lobar excision

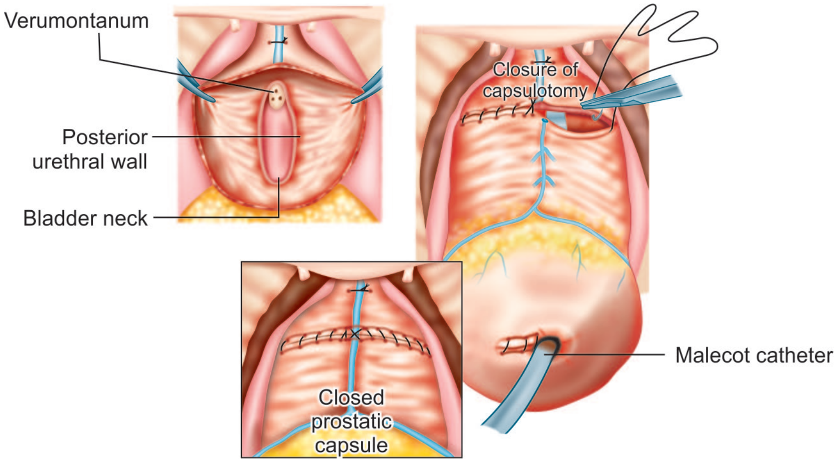

Figure 7.12: Capsulotomy closure and supravesical cystostomy

- Ankylosis of hip
- Recurrent stricture urethra or hypospadias
- Large inguinal hernia with large adenoma.

CONTRAINDICATIONS

- Small fibrous gland
- Prostate malignancy
- Previous prostatectomy or pelvic surgery.

PREOPERATIVE EVALUATION

- IPSS score
- Cystoscopy – hematuria, r/o stricture, presence of bladder calculus or diverticulum
- DRE, serum PSA – r/o CaP
- Complete medical and drug history
- Blood availability.

POSTOPERATIVE MANAGEMENT

- Traction
- Continuous bladder irrigation
- If bleeding, cystoscopy, re-exploration, packing
- Early mobilization
- Drains.

COMPLICATIONS

- Bleeding
- Urinary extravasation
- Urinary urgency
- Stress incontinence
- Acute cystitis, epididymitis

- Erectile dysfunction (3–5%)
- Deep vein thrombosis, pulmonary embolus, myocardial infarction, and a cerebrovascular event (<1%).

Table 7.1: Efficacy

	IPSS	*QL*	*Voiding volume (mL)*
Baseline	19.4 ± 4.4	4.9 ± 0.9	290 ± 9
1 year	1.5 ± 2.7	0.2 ± 0.4	427 ± 82
Difference	–18.5 ± 5.1	– 4.7± 1.1	211 ± 107
PS	0.0001	0.0001	0.0001
	Qmax (mL/sec)	*PVR (mL)*	*Bladder wall thickness (mm)*
Baseline	9.1 ± 5.3	128 ± 113	5.2 ± 0.7
1 year	29.1 ± 8.9	8 ± 18	2.9 ± 0.9
Difference	+19.8	–124 ± 115	–2.3 ± 1
P ≤	0.0001	0.0001	0.0001

Source: Tubaro A, Carter S, Hind A, Vicentini C, Miano L. A prospective study of the safety and efficacy of suprapubic transvesical prostatectomy in patients with benign prostatic hyperplasia. J Urol. 2001;166:172–6.

CLINICAL OUTCOME FOLLOWING OPEN PROSTATECTOMY

In a landmark study, Meyhoff and coworkers demonstrated in a comparative randomized study that open prostatectomy is well accepted by patients with only 9% of patients were dissatisfied by treatment compared to 15% of the TURP group.

Table 7.2: Clinical outcome following open prostatectomy

	N	*LURS*	*Qmax*	*Morbidity*
TURP	43	–90%	+88%	53%
Open	32	–87.5%	175.5%	68%

	Patient's dissatisfaction	*Failure rate*
TURP	16%	4.6%
Open	9%	0

Source: Meyhoff HH, Nordling J. Long term results of transurethral and transvesical prostatectomy. A randomized study. Scand J Urol Nephrol. 1986;20:27–33.

Table 7.3: Outcomes

	BNC	*Incontinence*	*UTI*	*Transfusion rate*
TURP	7% (5–8)	3% (2–5)	6% (5–9)	8% (5-11)
Open	8% (2–17)	6% (1–20)	8% (3–17)	27% (23–32)

	Cardiovascular/Thromboembolic	*Secondary procedure*
TURP	2% (0–8)	5% (4–6)
Open	1% (0–8)	1% (0–8)

Source: AUA guideline on management of benign prostatic hyperplasia. Chapter 1: Diagnosis and treatment recommendations. J Urol. 2003;170:530-47.

OUTCOMES

- The improvement at 8 to 12 months, as documented by:
  - An increase in Qmax
  - Decrease in PVR urine volume
  - Decrease in lower urinary tract symptoms
  - Quality of life improvement, was statistically significant after the procedure and did not change significantly even after longer follow-up (41.8 months).

CURRENT SCENARIO

- Better patients selection,
- Better anesthesia techniques,
- Change in transfusion policies, and
- Improvement of surgical standards decrease in complication rates.

The overall rate of morbidity and mortality associated with open prostatectomy is considered to be lower than reported in the early seventies.

ADVANTAGES

- Lower retreatment rate
- More complete removal of adenoma
- Direct vision
- Avoids dilutional hyponatremia.

DISADVANTAGES

- Intraoperative hemorrhage and transfusion rate is still a major concern.
- In the series evaluated by Tubaro and coworkers a unit of blood was transfused in the 68% of patients evaluated.
- Wound complication or urinary fistula can also be of concern in the immediate postoperative period in the 0.4–4% of patients.

Disadvantages
- Hospital stay is longer
- Urinary incontinence
- Bladder neck contractures (BNC) and
- Urethral strictures (incidence comparable to TURP (2–20%)
- Erectile dysfunction occurs in 3% to 5%
- Retrograde ejaculation in 80% to 90% of patients.

COST ANALYSIS

- The higher costs of treatment are related to the longer hospital stay.
- The lower expenses after primary treatment are related to the lowest retreatment rate.

POSTGRADUATE TRAINING

- Open prostatectomy accounted for 0.1% of BPH surgery in USA.
- The decreasing number of procedures performed in western countries may jeopardize adequate postgraduate training for our future residents.
- A long learning curve is expected.

CURRENT INDICATIONS

- The Vth International Consensus on BPH considered that open prostatectomy remains indicated in patients with prostate larger than 80–100 grams
- In patients with coexisting disorders (hernia, large bladder stone and diverticula).

ALTERNATIVES TO OPEN PROSTATECTOMY IN LARGE ADENOMA

- HoLEP
- Complete enucleation without much bleeding associated with TURP for large lobes
- No size limitation
- Disadvantages – Cost, long learning curve, long duration of surgery.

Table 7.4: HoLEP

Characteristics	
Age	73.7 (52–94)
Indications of surgery	
• LUTS	121 (53.8%)
• Urinary retention	102 (45.3%)
• Hematuria	2 (0.9%)
TRUS volume (cc)	126.4 (80–351)
Preoperative PSA (ng/mL)	9 (0.41–55)
Preoperative IPSS	18.7 (8–35)
Preoperative QoL	3.7 (1–6)
Preoperative Qmax (mL/sec)	8 (0–15)
Preoperative PVR (mL)	325.4 (14–2,000)

Source: Elzayat EA, Elhilali MM. Holmium laser enucleation of the prostate (HoLEP): The endourologic alternative to open prostatectomy. J Eur Uro.2006;49(1):87-91.

CONCLUSION

- Open prostatectomy is bound to disappear in the Western World (In USA 0.1% cases per year)
- It will remain a useful technique in many developing countries where it may still serve patients well.

SUGGESTED READING

1. Freyer PJ. A new method of performing prostatectomy. Lancet. 1900;1:774.
2. Fuller E. Six successful and successive cases of prostatectomy. J Cutan Genitourin. 1895;13:229.
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8

Laparoscopic Management of Benign Prostatic Hyperplasia

• Pradeep Rao

Literature Review

- Fairly new procedure
- First reported in 2002
- PubMed search shows 20 + publications over the last 10 years
- Regressive step—From NOTES to Laparoscopy?

Pioneers in this Field

- Mariano et al, Case report, J Urol 2002 (M).
- Piechaud, Pilot study, Eur Urol 2004 (M).
- Rahman et al, Case reports, (M + F).
- Sotelo et al, First large series, J Urol 2005.

Technique

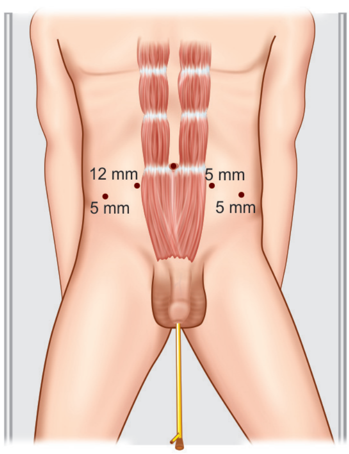
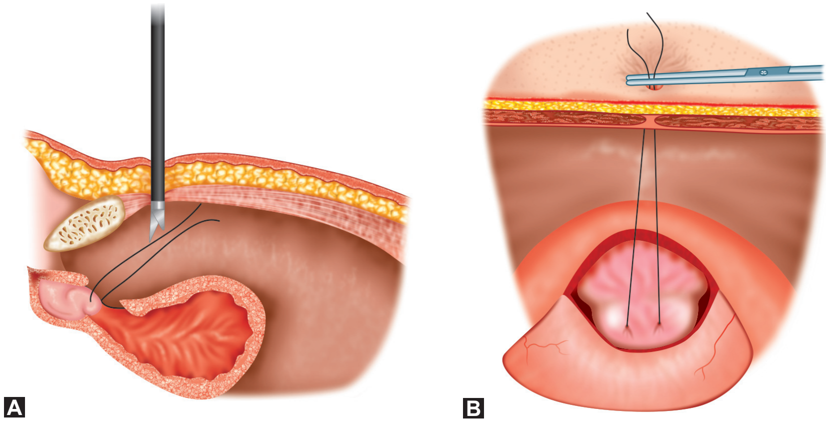
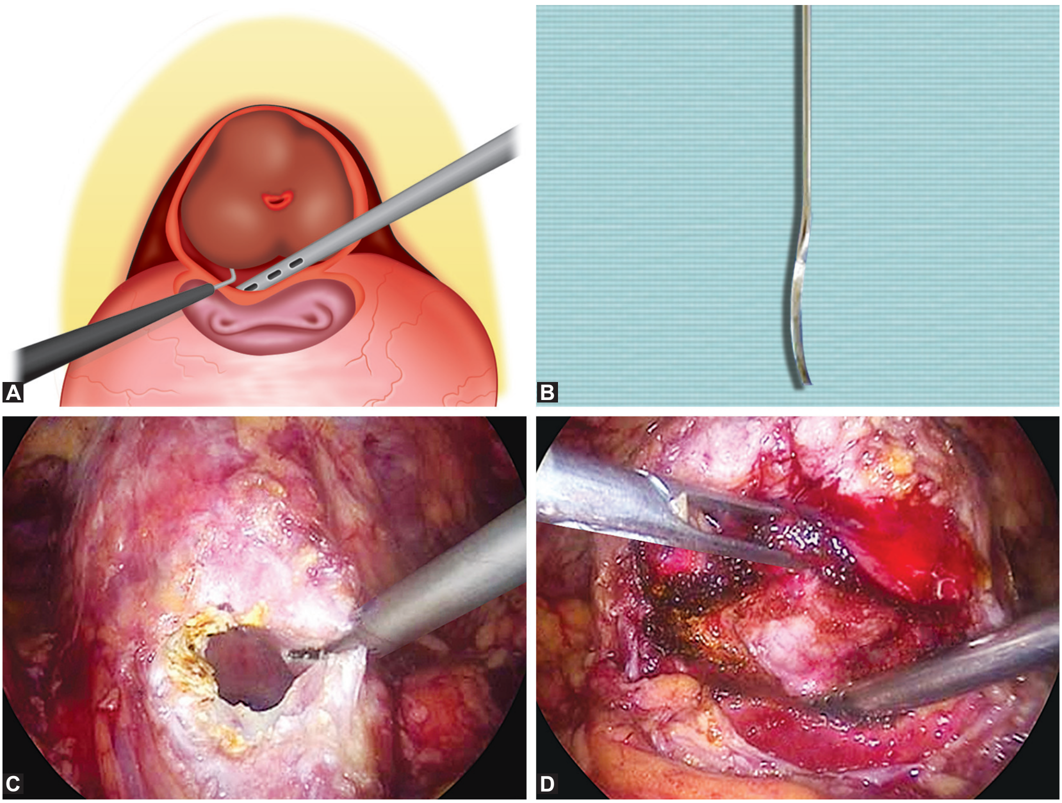


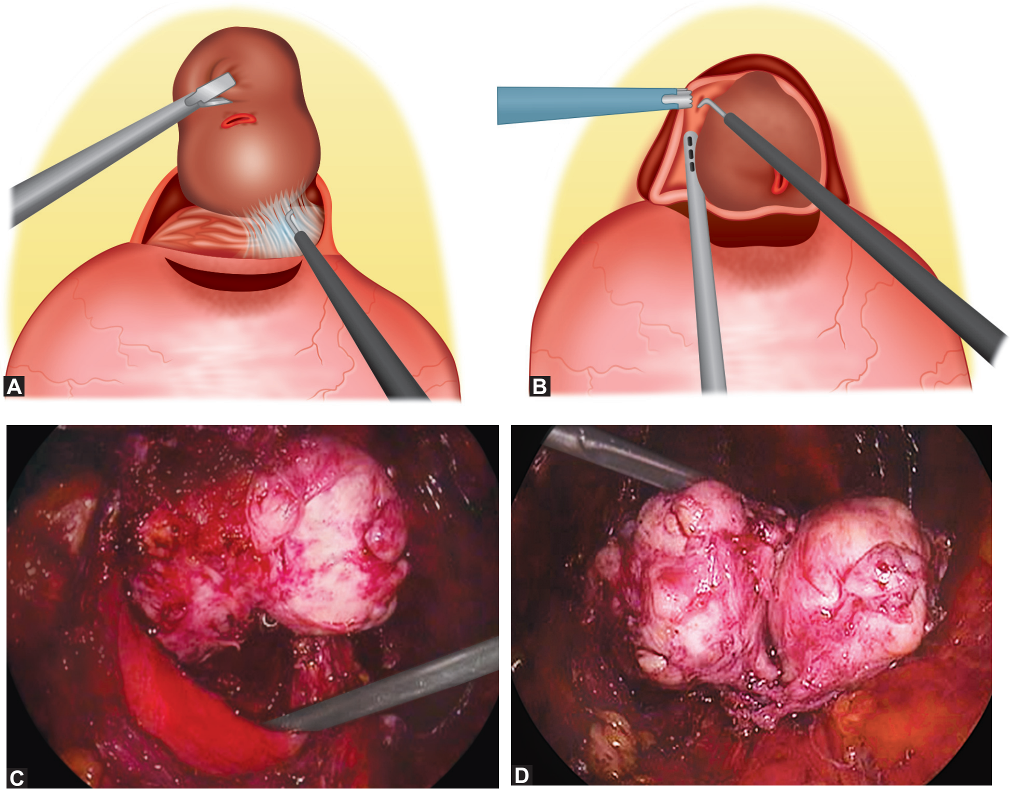
Figure 8.1: Port placement



Figures 8.2A and B: Prostatetomy



Figures 8.3A to D: Enucleation



Figures 8.4A to D: Retrigonalization and closure

Problems

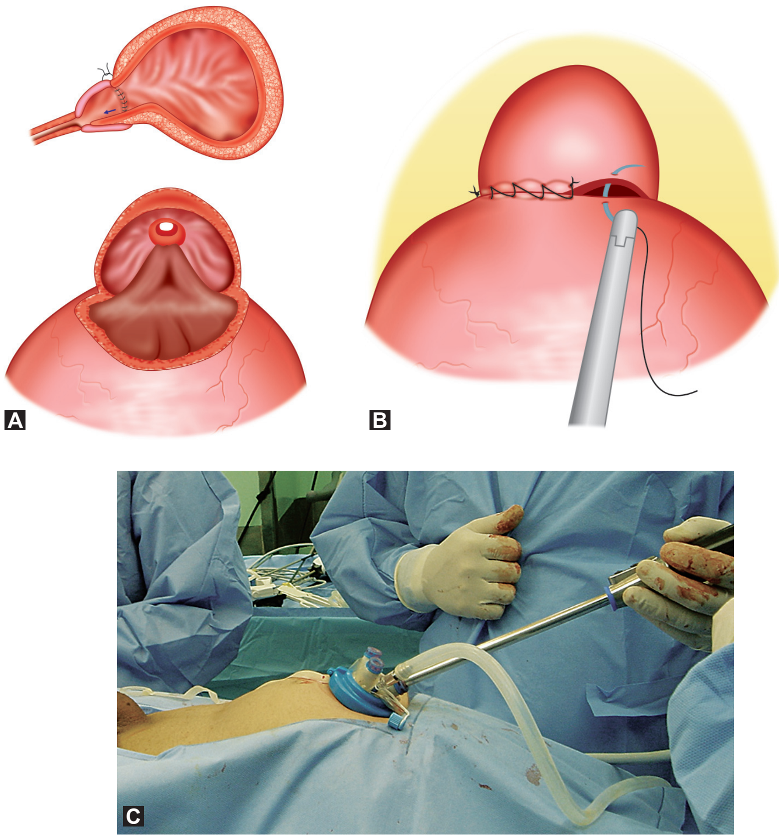
- High Blood loss in a few cases
- Extended operative times
- High degree of skill required.

Transvesical BPH

- Conceived in Cleveland
- Using a technique developed in India
- Only possible with the R-Port.

STEP—Single Port Transvesical Enucleation of Prostate

- 50 cases
- Showed early promise
- Useful for very large glands
- Approximately 50% required finger enucleation
- Modification required.



Figures 8.5A to C: Single port—Millin's

Hybrid Technique

- Problem with STEP—Enucleating at apex
- Problem with transurethral enucleation—Enucleating at bladder neck and morcellation
- Combined technique overcoming these.

BPH—Combined Approach

Hybrid Approach

- Rao PP et al, Urology 2011
- 9 cases
- Operative times are short
- Bleeding less
- Short urethral instrumentation time
- Consumable cost high.

9

Acute Urinary Retention in Benign Prostatic Hyperplasia

• Sanjay Swain

INTRODUCTION

Acute urinary retention represents the most common indication for benign prostatic hyperplasia (BPH) related surgery but its management is still not standardized because of a lack of existing guidelines.

Definition

Sudden and painful inability to pass urine voluntarily.

INCIDENCE

- About 0.5–2.5% person per year.
- However, this risk is cumulative and increases with advancing age
- Proscar long-term efficacy and safety study (PLESS) (BPH): 1.8/100 patient/year.
- Olmsted County Study (community): 0.6/100 patient/year.

TYPES

- Spontaneous:
  - Usually associated with previous lower urinary tract symptoms (LUTS).
- Precipitated:
  - Inability to urinate following a triggering event
  - No previous LUTS.

Table 9.1: Outcome of acute urinary retention

Acute urinary retention	*Recurrent episode (%)*	*Surgery (%)*
Spontaneous	15	75
Precipitated	9	26

Catheter

- Per urethral catheter
- Suprapubic catheter (SPC)
- CSIC.

Table 9.2: Initial management of acute urinary retention (AUR) in 6074 men catheterized for painful AUR

	Total	*France*	*Asia*	*Latin America*	*Algeria*	*Middle east*
	(N = 6074)	(N = 2618)	(N = 1727)	(N = 883)	(N = 755)	(N = 91)
Type of practice, %						
Public	37.4	33.1	85.7	16.9	83.3	40.0
Private	41.9	54.9	1.0	22.3	16.7	10.0
Both	20.7	12.0	13.3	60.8	0	50.0
Type of catheter, %						
Urethral	89.8	82.7	94.5	98.1	93.1	95.6
Suprapubic	8.2	16.7	1.8	1.0	2.3	3.3
In and out	1.8	0	3.7	0.9	4.6	1.1
Unspecified	0.3	0.6	0	0	0	0
Catheterization performed by, %						
Urologist	60.5	81.3	36.5	59.0	50.1	63.7
Emergency room physician	21.1	0.4	35.8	30.6	40.9	33.0
Nurse	15.3	17.3	21.5	8.4	4.4	1.1
Other	3.2	1.0	6.1	2.0	4.6	2.2
Drained volume, %						
<1000 mL	68.4	63.2	72.6	67.7	77.0	75.8
	31.6	36.8	27.4	32.3	23.0	24.2
Hospitalization for AUR						
Yes, %	57.4	100.0	40.4	12.6	1.7	52.7

- Do you give antibiotics before and after catheterization?
- Recommendation: No unless evidence of infection.
- Do you believe in slow decompression?
- Recommendation: No.

Cautery Free Technique (CFT): Trial without Catheter (TWOC)

- When will you give a CFT (TWOC)
  – After 2/3 days or 7 days or longer?
- What do the guidelines say?

Table 9.3: Management after catheterization

	Total	*France*	*Asia*	*Latin America*	*Algeria*	*Middle East*
	(N = 6074)	(N = 2618)	(N = 1727)	(N = 883)	(N = 755)	(N = 91)
TWOC	76.8	72.8	75.4	75.8	93.6	91.2
Immediate surgery	7.2	5.7	12.9	6.5	0.5	4.4
Prolonged catheter and elective surgery	13.3	17.9	9.4	15.1	5.0	4.4
Stent	0.2	0.4	0.1	0	0	0
Indwelling catheter	1.6	1.1	2.4	2.6	0.5	0
Unspecified	1.1	2.1	0	9.2	0.3	0

Results of Trial without Catheter (TWOC)

- Djavan et al: randomized men with AUR 3 group (without any medication)
  - In and out catheterization: 44%
  - 2 days: 51%
  - 7 days: 62%.

Natural Course of AUR

- Klarskov and colleagues, Re-retention
  - 56% within 1 week,
  - 62% within 1 month,
  - 68% within 1 year.
- The mean time to the second episode of AUR was 1.4 years.

Table 9.4: Results of TWOC

	Total (N = 4667)	*France (N = 1906)*	*Asia (N = 1302)*	*Latin America (N = 669)*	*Algeria (N = 707)*	*Middle East (N=83)*
Duration of catheterization before a first TWOC; days						
• Median	5	3	6	6	8	7
• ≤ 3 days, %	41.3	65.2	30.8	24.6	19.5	20.7
• > 3 days, %	58.7	34.8	69.2	75.4	90.5	79.3
α–blockcade before TWOC*						
• Yes, %	85.9	79.0	89.5	85.1	97.9	
First TWOC (n)						
• Success rate, %	61.4	50.2	66.0	75.2	69.0	71.1
Outcome if first TWOC, is successful						
• Medical treatment, %	88.8	76.8	94.8	89.3	99.6	98.3
• Surgery whatever the outcome, %	5.7	8.5	3.1	9.3	1.4	1.7

Contd...

Contd...

• Surveillance and surgery if needed, %	19.7	24.8	4.5	5.0	53.1	5.1
• Other, %	3.4	0.4	0.7	0	0	0
Outcome if first TWOC fails						
• Recatheterize and try a second TWOC	43.5	33.4	42.8	45.8	85.8	54.2
• Recatheterize and plan surgery	49.0	57.5	48.9	51.2	12.8	33.3
• Stent	0.9	1.5	0	0	0	12.5
• Long-term catheter	2.8	1.1	7.2	3.0	1.8	0
• Other	3.5	6.1	1.1	0	0	0

* Alfuzosin 68.2% tamsulosin 16.5%, doxazosin 6.1%, terazosin 26%, prazosin 0.1% + Sum is higher than 100% because several options may be ticked NR, not reported, TWOC, trial without catheter

Table 9.5: Management in case of TWOC

	Total (N = 4667)	*France (N = 1906)*	*Asia (N = 1302)*	*Latin America (N = 669)*	*Algeria (N = 707)*	*Middle East (N = 83)*
Second TWOC *(n)*	(782)	(316)	(189)	(76)	(188)	(13)
• Success rate, %	29.5	25.9	44.1	**30.7**	19.7	38.5
Outcome if second TWOC is a sucess						
• Medical treatment, %	88.8	77.2	97.6	82.6	100	100
• Surgery whatever the outcome, %	5.7	7.6	3.1	9.3	1.4	1.7
• Surveillance and surgery if needed, %	19.7	24.8	4.5	5.0	53.1	5.1
• Other, %	3.4	0.4	0.7	0	0	0
Third TWOC (*n*)	(102)	(14)	(41)	(14)	(32)	(1)
• Success rate, %	26.4	NR	32.5	21.4	18.8	100

Risk Factors for TWOC Failure

- Older age (≥ 70 years)
- Enlarged prostates (> 50 g)
- Severe prior LUTS
- Large drained volume (≥ 1000 mL)
- Spontaneous AUR
- Multivariate analysis reveals catheterization for > 3 days does not influence the success rate but is associated with a greater morbidity
- Recommendation: TWOC 3 days with alpha-blocker cover.

Criteria of Successful TWOC

- Q max: > 5 mL/sec
- Voided volume : > 150 mL
- Residual urine: <100 mL.

Before Giving TWOC

- Use of an α 1-blocker before TWOC significantly increased the overall success rate (63.4% vs 49.5%, $P < 0.001$).

Medical Management after Successful TWOC

- Will you continue an alpha blocker or 5 ARI or a combination? How long?
- If combination tamsulosin with tinasteride/dutasteride or alfuzosin with finasteride/dutasteride?

Alfaur Study Group (J Urol 2006)

- McNeill et al. studied a cohort of 360 patients that underwent emergency catheterization.

Conclusion

Alfuzosin successful TWOC rate (61.9%) vs placebo (47.9%).

- Surgical risk reduction
  - 61%–1 month
  - 52%–3 month
  - 29%–6 month
- Most AUR relapses occurred within the first 3 months (81%) after the first episode.

Palit et al. (Eur Urol 2002)

- At 4 years follow-up, 80% patients on Alfuzosin had undergone surgical interventions.
- He concluded: these data did not support the long-term use of alpha1-blockers in patients who voided successfully after AUR.

Lucas et al. Tamsulosin vs Placebo

- About 48% of patients on Tamsulosin did not require recatheterization on the day of TWOC vs 26% placebo.
- About 81% patients had to be withdrawn from the study (60% as a result of recatheterization).

Medical Therapy of Prostate Symptoms (MTOPS) Study

- Combination medical treatment significantly reduces risk of progression to AUR.
- Doxazosin monotherapy did not significantly decrease the risk for AUR versus placebo (34% risk reduction, P = NS).

Recommendations

- Immediately catheterize men with ARU due to BPH (NHS).
- Initial treatment with a Foley urethral catheter, rather than a suprapubic catheter (Grade 2B).
- No role for slow decompression (Grade 1C).
- Offer an alpha blocker to men for managing ARU due to BPH before removal of the catheter (NHS) (Grade 1A).

Recommendation

- TWOC 3rd day (Grade 2B).
- Can consider a combination of Alpha blocker with 5 ARI in large glands for ongoing treatment to prevent Re- AUR.
- Can proceed with surgery if 1st TWOC fails (Grade 2B).

10

Chronic Urinary Retention

• Suresh Bhat

CHRONIC RETENTION

ICS definition: “non-painful bladder, which remains palpable or percussible after patient has passed urine”.
Persistent post-void residue more than bladder capacity
Abrams->300 mL
NICE guidelines: >1000 mL
Therefore, there is no definite cut-off value.

Types

- High pressure chronic retention
  - Late onset enuresis
  - Tense painless palpable bladder
  - Hypertension
  - Bilateral hydroureteronephrosis (HUN)
  - Elevated detrusor pressure at the end of micturition (i.e. at the beginning of next filling cycle).
- Low pressure chronic retention
  - Usually bladder felt as vague mass or not palpable
  - Usually no HUN.

Issues Involved

- To catheterize or not
- If bladder decompression indicated:
  - Per urethral
  - Suprapubic
  - CISC
- Urodynamics (UDS): To do or not to do
- Surgery: To do or not to do.

To Catheterize or Not

- Evidence of renal failure or salt and water retention—urgent catheterization
- Otherwise there is no emergency for catheterization
- Beware of postobstructive diuresis and manage it accordingly
- Speakman et al, 2009, European Urology SPLMT.

Per Urethral Catheter versus Suprapubic Catheter (PUC vs SPC)

- Patient preference
- SPC:
  - Less UTI
    - Less stricture formation
    - Ability to have sex
    - TURP: complications less
- Disadvantages:
  - Technical expertise
  - Intestinal injury
  - Bleeding
- Speakman et al, 2009, European Urology SPLMT.
- Advantages
  - Recovery of renal function
  - Recovery of bladder function
  - 4–6 weeks catheterization (Ghalayini et al, BJUI, 2005).

Urodynamics Study (UDS)

- Optional
  - Because even if the preoperative UDS suggests unfavorable outcome, 63% gained significant benefit following surgery (Djavan et al and Monoski et al).
  - Detrusor underactivity: no long-term symptomatic or urodynamic gains after surgery (Thomas et al).
- Done after 4–6 weeks of bladder drainage (Ghalayini et al, BJUI, 2005).

To do Surgery or Not

- One school of thought is to do immediate surgery if renal function is normal and to keep the catheter for 3–4 weeks.
- If chronic urinary retention (CUR) is due to obstructive etiology, surgery is useful especially if it is high pressure chronic retention (HPCR).
  - Detrusor underactivity: no long-term symptomatic or urodynamic gains after surgery (Thomas et al).

Risks of Immediate Surgery in Chronic Retention

- Vulnerability to infection as a result of loss of local defenses in the bladder
- Risk of bleeding in moderate or severe renal insufficiency
- Surgery can be undertaken if serum creatinine is below 2.5; above this level, presence of platelet dysfunction increases risk of bleeding.

- Higher creatinine levels also depress T-cell mediated immunity, increasing risk of invasive sepsis.

Role of Nonsurgical Management

- If patient has multiple comorbidities and not willing for any procedures conservative management with frequent follow-up with renal function studies and USG:50% remained stable at 5 years (Bates et al.)
- Renal failure, acute retention, recurrent UTI and bladder stones are not commonly associated with chronic retention.

Low Pressure Chronic Retention

- Management:
  - No urgency for catheterization
  - SCIC (4–6 weeks)—UDS
  - TURP—CSIC/SPC/PUC
  - Role of parasympathomimetics: no definitive proof (S Krishnamoorthy et al. IJU 2009).

Future

- Myogenic failure
- Skeletal muscle stem cell transfer.

Summary of NICE Guidelines

- Carry out a serum creatinine test and imaging of the upper urinary tract in men with chronic urinary retention.
- Catheterize men who have impaired renal function or hydronephrosis secondary to chronic urinary retention.
- Consider offering intermittent or indwelling catheterization before offering surgery in men with chronic urinary retention.
- Consider offering intermittent self- or carer-administered catheterization instead of surgery in men with chronic retention who you suspect have markedly impaired bladder function.
- Continue or start long-term catheterization in men with chronic retention for whom surgery is unsuitable.
- Provide active surveillance (post-void residual volume measurement, upper tract imaging and serum creatinine testing) to men with non-bothersome LUTS secondary to chronic retention who have not had their bladder drained.

11

Asymptomatic Prostatic Enlargement

• Ulhas Sathaye

CASE–1

- A 65-year-male undergoes routine medical check-up
- No voiding dysfunction
- Known hypertensive on treatment
- No other medical problems
- BP 140/80, rest systemic normal
- Abdomen, genitals normal
- Moderately large, smooth, firm prostate.

Investigations

- – Blood tests normal, creatinine 0.9 mg%
- – Prostate specific antigen (PSA) 2.9 ng%
- – Urine : Normal
- – USG : Upper tracts normal
  : Prostate 70 cc
  : Post-void residual (PVR) 30 cc.

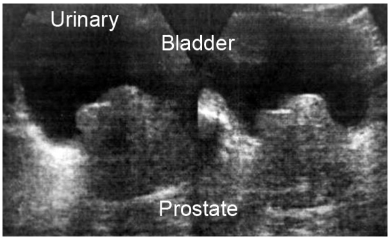


Figure 11.1: Large median lobe

CASE–2

- A 73-years-old male, planned for hernia surgery, referred for urological clearance
- No history of LUTS or dysuria
- No history of AUR
- No medical problems
- Abdomen soft, bladder not palpable
- Bilateral inguinal herniae
- Genitals normal
- Large (grade III), firm, smooth prostate.

Investigations

- Creatinine 1.3 mg%
- PSA 3.1 ng%

- Urine normal
- Upper tracts normal
- Urinary bladder (UB)—well distended
- Prostate—139 cc with large median lobe, normal echotexture
- PVR—60 cc.

Predictors for Progression

- Age
- Prostate size
- PSA
- LUTS (AUA score ≥ 8)
- Low PFR (< 12 mL/s)
- High PVR
- Previous episode of AUR.

WHO ARE AT RISK FOR PROGRESSION?

- Men older than 60 years age
- Men having lower flow rates at baseline (< 12 mL/sec)
- Men having large prostate volumes (> 30 cc)
- Men with identifiable LUTS.
- Increasing symptoms
- Acute retention
- UTI
- Rising creatinine
- Complications.

Table 11.1: Progression in the MTOPS study placebo group

Placebo treatment group Progression Rate/100 patient-years	
Clinical progression	*PLB*
Overall	4.5
AUASS	1.6
AUR	0.6
Invasive Therapy	1.3
Abbreviations: MTOPS, medical therapy of prostatic symptoms; PLB, placebo; AUASS, American Urological Association Symptom Score; AUR, acute urinary retention	

Source: Data from McConnell JD et al

PRIMUM NON NOCERE (First do the Patient no Harm)

Why Treat the Asymptomatic Prostate?

- Alpha blockers and 5 AR inhibitors are safe, effective and have long term durability.
- Medical therapy can impact the progression of the disease (PLESS and MTOPS studies)
- Medical therapy can halt progression parameters like worsening of symptoms and AUR can an asymptomatic male be obstructed?

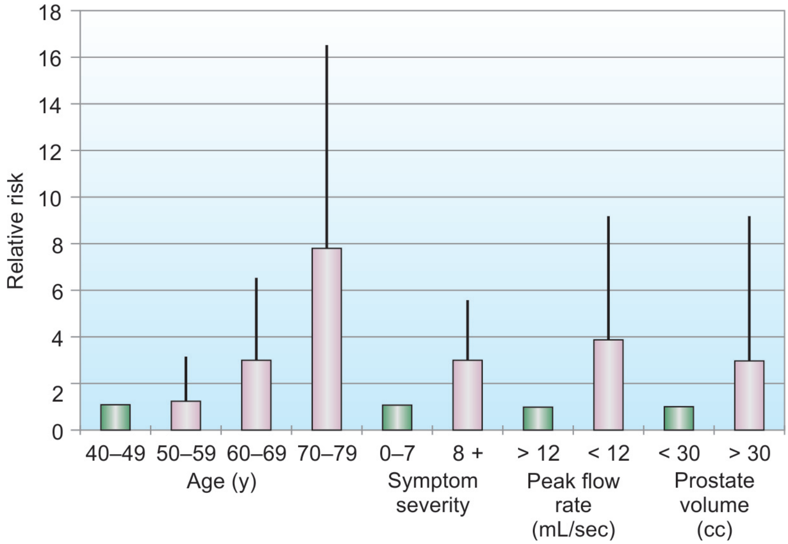


Figure 11.2: Relative risk for progression of prostate

Source: Olmsted County Study, Jacobsen SJ et al, J Urol. 1997;158:481–7.

- Pressure flow data in asymptomatic men older than 45 years revealed
- 13% had unequivocal obstruction
- 29% had equivocal obstruction and
- 58% had no obstuction.

Bladder Changes in an Asymptomatic Male

- Detrusor hypertrophy defined as smooth muscle proliferation fibroblast hyperplasia and reorganization of extracellular matrix occurs as the patient ages
- These changes affect detrusor contractility, function and presumably LUTS.

Why Not to Treat the Asymptomatic Patient?

- Compliance of the patient
- Motivation for the patient
- Economic considerations.

Food for Thought

- Would medicines be effective in preventing progression even in such large gland, or would surgery be compulsory?
- If medicines, combination or only 5 alpha reductase inhibitor?
- If combination, can alpha blockers be dropped after 6 or 12 months?
- How to follow-up and judge efficacy of medication?

SUGGESTED READING

1. Walker RMH, Romano G, Davies AH, et al. Pressure flow study data in a group of asymptomatic male control patients 45 years old or older. J urol. 2001;165:683-7.

12

Sudden Death After Benign Prostatic Hyperplasia Surgery

• Anil Bradoo • Phiroze Soonawalla • Prerana Shah

INTRODUCTION

Surgery for benign prostatic hypertrophy is common procedure in urology. Although rare, sudden death can be devastating to the family as well as the surgeon. Mortality after trans urethral resection of prostate (TURP) is gradually declining. From 2.8% in 1962, it has declined to 0.1% in 2006 (1974—1.3%, 1989—0.23%).

CAUSES

Patient Factors

The predisposing factors for sudden death include existing comorbidities of the patient and age. Myocardial infarction, hemorrhagic cerebral infarction, convulsion, pulmonary thromboembolism, hypoglycemia can occur due to the existing medical diseases in the patient and may lead to mortality.

Positioning Related

Degeneration of cervical spine in these elderly patients makes them prone for such events especially during shifting to and from OR trolley. Raising or lowering of both legs during lithotomy position must be done simultaneously. Rapid lowering of legs at the end of surgery can acutely reduce the venous return and cause severe hypotension especially when combined with blood loss or effect of spinal blockade.

Surgical Causes

Blood loss and dilutional hyponatremia are often sequelae of TURP surgery. One must watch for abdominal girth and neurological function of the patient.

Anesthesia Related

Usually, TURP surgery is done under regional anesthesia. Rarely, inadvertent injection of top up of epidural dose of drug into intrathecal space can lead to severe bradycardia

and hypotension, which can cause cardiac arrest. If undiagnosed, apnea, hypoxia and aspiration during general anesthesia can cause sudden death.

MANAGEMENT

Intensive monitoring is an extremely important means of recognizing signs of pre-eminent cardiac arrest. Treat according to the clinical scenario. Latest guidelines of cardiopulmonary cerebral resuscitation must be followed.

Prevention

Precautions during positioning must be taken. In diabetic patients, blood sugar must be checked regularly. Pulse oximetry must be used in postoperative period to diagnose hypoxia. Breathing and blood pressure must also be monitored. Intravenous fluids must be continued in the postoperative period. Early ambulation, graduated compression stockings, intermittent pneumatic compression and low dose unfractionated heparin help in preventing deep vein thrombosis.

Sudden death can shatter all. Always follow strict treatment protocols. Good communication with the patient and their relatives go a long way in avoiding medicolegal problems in such unfortunate incidents.

Preventive Measures: Deep Vein Thrombosis (DVT)

- Incidence of DVT post-TURP can be from 2–10%
- All patients should have early ambulation as DVT prophylaxis
- Patients with mild risk—graduated compression stockings/intermittent pneumatic compression.
- Patients with high risk—low dose unfractionated heparin/low molecular weight heparin.

How to Handle Relatives

- Preoperative investigations and counseling
- Preoperative—Informed, valid and written consent
- Good communication
- Evidence based written information, suitable to type of patient and culturally appropriate
- Show compassion and offer immediate support
- Be ready to listen to all their questions and explain the truth.

Medicolegal Implications

- Try and understand the family first
- Any unexplained death in first 24 hours of surgery/even later needs a postmortem
- Any evidence of cause of death—ECG/d-dimer can help in certifying cause of death
- Sixth sense—early legal counsel.

Sudden Death can Shatter all

- It can happen to anyone
- Always follow strict treatment protocols
- Be there to face the reality or be prepared to face the consequences.

13A

Post-prostatectomy Incontinence

• Ganesh Gopalakrishnan

INCIDENCE

- Highly variable (2–60%)
- Lack of standardized definition
- Catalona, “If men have to wear any kind of protection at all, they are incontinent”.

ETIOLOGY OF POST-PROSTATECTOMY INCONTINENCE

- Exact mechanism is not known
- Bladder neck dysfunction
- Damage to periprostatic nerves
- Damage to sphincter
- Functional urethral length less than 28 mm
- Rocca’s stitch.

TREATMENT

- Conservative
- Pharmacotherapy
- Surgical treatment
- Catalona, permanent incontinence occurs infrequently with an experienced surgeon. Do not touch the fibres of the external sphincter. *“The fear far outweighs the reality”*

Artificial Urinary Sphincter

- Success rates 90%
- Grade of recommendation B
- Level of evidence 2
- Techniques of placement
- Trans-scrotal
- Perineal

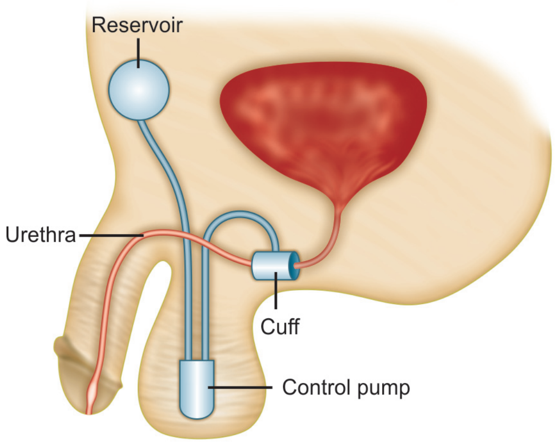


Figure 13A.1: Artificial urinary sphincter—AUS

Zephyr Artificial Sphincter

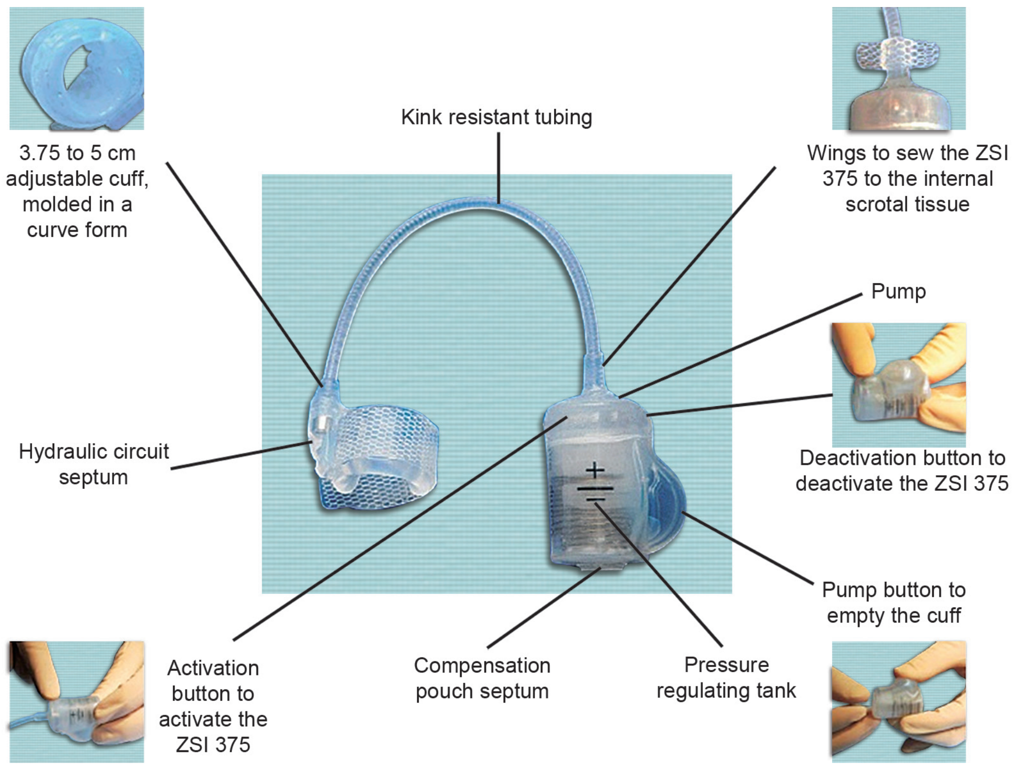


Figure 13A.2: Zephyr artificial sphincter

Zephyr: ZSI 375

- One-piece device
- A cuff + a pump unit
- Silicone
- Pressure control
- Zephyr: ZSI 375

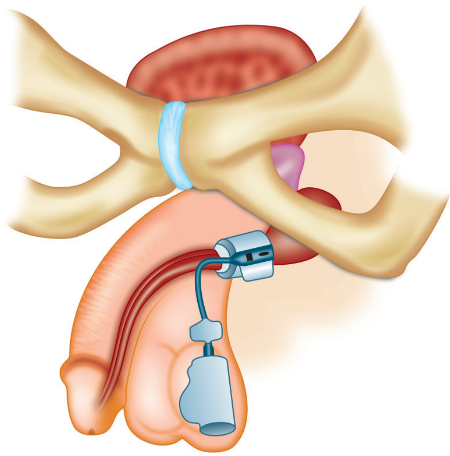


Figure 13A.3: Zephyr: ZSI 375

Working of Zephyr

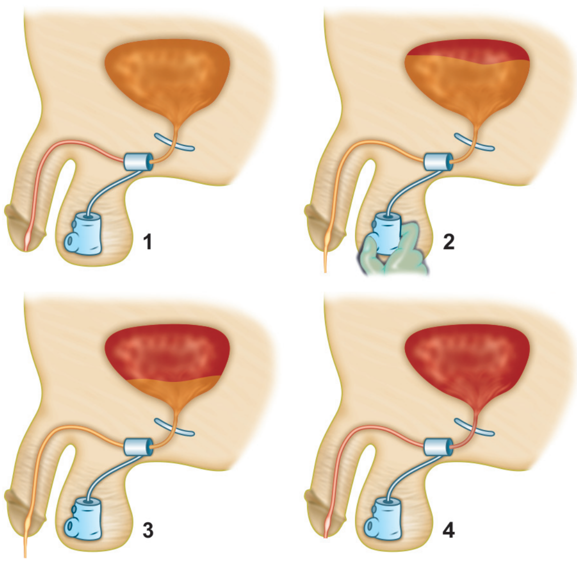


Figure 13A.4: The artificial urinary sphincter ZSI 375 works like an intrinsic sphincter. The patient is continent as the cuff squeezes the urethra (1); To urinate, the patient squeezes and releases the pump button located in the crotum (2); The cuff deflates releasing the pressure around the urethra. The patient can urinate (3); The cuff needs 2–3 minutes to automatically reinflate and to squeeze the urethra again (4)

13B

Management of Post-prostatectomy Urinary Incontinence

• Aneesh Srivastava

ANATOMY OF MALE CONTINENCE

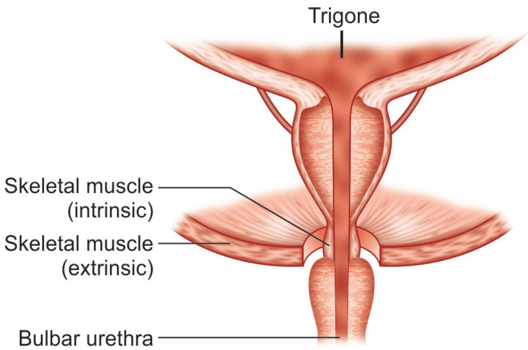


Figure 13B.1: Coronal section

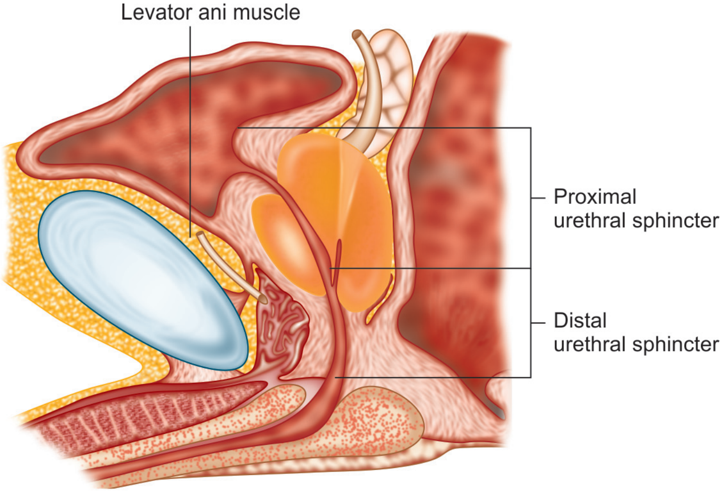


Figure 13B.2: Sagittal section

INTRODUCTION

- Post-prostatectomy incontinence (PPI)—uncommon complication of the prostatectomy
- Incidence:
  - Post-prostatectomy for benign disease: 0.4–3.3%
  - Post-prostatectomy for Ca prostate: 2–30%.

SPECTRUM OF PPI

- Stress urinary incontinence: “the involuntary loss of urine by effort, exercise, sneeze or cough”
- Urge incontinence: “Involuntary loss of urine accompanied by sudden compelling desire to void, which is difficult to defer”
- Mixed urinary incontinence: Which is defined as “the involuntary urine loss accompanied by urgency and preeded by effort, exercise, sneeze or cough”
- The 24-hour pad test is the most accurate and reproducible for quantification and diagnosis of urinary incontinence
- The standardized 1-hour pad test is most widely used due to feasibility reasons, with the grading of the SUI as follows:
  - Grade 1, urine loss in 1-hour pad test <10 g
  - Grade 2, urine loss in 1-hour pad test 11–50 g
  - Grade 3, urine loss in 1-hour pad test 51–100 g
  - Grade 4, urine loss in 1-hour pad test >100 g

RISK FACTORS

- Age at surgery
- Preoperative bladder function and urinary continence status
- Medical comorbidities, e.g. DM, CVA
- *Advancing age—a risk factor!*
  - In < 50 years of age, continence rate is 100% at 1 year
  - 50–59 years continence rate is up to 91%
  - > 60 years, continence rate is up to 81%.
- A progressive reduction in sphincter striated muscle cells with age has been demonstrated.

ETIOLOGY AND PATHOPHYSIOLOGY

- The etiology of PPI—multifactorial
- Bladder dysfunction
  - Detrusor overactivity
  - Decreased bladder compliance
- Sphincter injury
- Combination of both.

DIAGNOSIS AND EVALUATION

- Validated tool for assessment of PPI—lacking
- Evaluation of PPI:
  - Severity of symptoms
  - Quality-of-life (QOL).
- Voiding diary kept for 3 to 5 days
  - Fluid intake
  - Number of incontinence episodes
  - Functional bladder capacity
  - 24-hour urine output.

REVIEW OF PATIENT

- Medications
  - Anticholinergic or diuretic actions that can affect bladder function
- A history of medical conditions and surgeries should focus on those with a possible impact on voiding, such as:
  - Back, pelvic, or urologic surgery
  - Stroke
  - Diabetes mellitus, vascular disease, and neurologic disease
- Validated quality-of-life questionnaires, such as the urinary distress inventory-6 short form, are often used to determine the severity of incontinence.

VALIDATED ICIQ-SF QUESTIONNAIRE TO ASSESS CONTINENCE

Hospital Number: .... Today's Date: ....

This questionnaire will help you decide whether you would consider further treatment for incontinence and how much your incontinence bothers you. Many people leak urine some of the time. Answer the following questions, thinking about how you have been on everage over the PAST FOUR WEEKS

1. Please wirte in your date of birth ....

   Date/ month/ year

2. Are you? (tick) Female ☐ Male ☐
3. How often do you leak urine? (tick one box)
   - never ☐ 0
   - about once a week or less often ☐ 1
   - 2 or 3 times week ☐ 2
   - about once a day ☐ 3
   - several times a day ☐ 4
   - all the time ☐ 5
4. Think how much urine do you usually leak (whether you wear protection or not)? (tick one box)
   - none ☐ 0
   - a small amount ☐ 2
   - a moderate amount ☐ 4
   - a large amount ☐ 6
5. When does urine leak? (Please tick all that apply to you)
   - never—urine does not leak ☐
   - leaks before you can get to the toilet ☐
   - leaks when you cough or sneeze ☐
   - leaks when you are asleep ☐

leaks when you are physically active/exercising ☐
leaks when you have finished urinating and are dressed ☐
leaks for no obvious reason ☐
leaks all the time ☐

6. Overall, how much does leaking urine interfere with your everyday life?
You may find the following continence/lifestyle questions will assist you with the scoring process.
Please do not spend too much time in answering, as you immediate response will probably be the most accurate. Please tick one box.
Has urine leakage affected your:
 a. Ability to do household chores (cooking, house cleaning, washing)?
 Not at all ☐ Slightly ☐ Moderately ☐ Greatly ☐
 b. Participation in physical activities such as walking, swimming or other exercise?
 Not at all ☐ Slightly ☐ Moderately ☐ Greatly ☐
 c. Willingness to go out to the cinema, concerts etc?
 Not at all ☐ Slightly ☐ Moderately ☐ Greatly ☐
 d. Ability to travel by car or bus more than 30 minutes from home?
 Not at all ☐ Slightly ☐ Moderately ☐ Greatly ☐
 e. Participation in social activities outside your home?
 Not at all ☐ Slightly ☐ Moderately ☐ Greatly ☐
 f. Emotional health (nervousness, depression, etc)?
 Not at all ☐ Slightly ☐ Moderately ☐ Greatly ☐
 g. Sense of feeling frustrated?
 Not at all ☐ Slightly ☐ Moderately ☐ Greatly ☐
Please ring a number between 0 (not at all) and 10 (a great deal)

0 1 2 3 4 5 6 7 8 9 10

not at all ←→ a great deal

This is your own personal assessment of how you perceive your incontinence. Having answered these questions the higher your score, the more likely the impact of invontinence on your lifestyle. You may find that if you score 1 or more an appointment with a woman's heath physiotherapist may be beneficial.

PHYSICAL EXAMINATION

- Abdominal straining or coughing in either the supine or upright position
- Perineal sensation and deep tendon and bulbocavernosus reflexes
- Anal sphincter tone—Abnormal reflexes may indicate a neurologic cause for voiding dysfunction
- PVR is a good estimation of voiding efficiency.

Laboratory Tests

- Urinalysis
- Serum PSA
- Serum creatinine.

Cystourethroscopy

- It can help to determine the cause of incontinence and is useful for:
  - Ruling out bladder neck contracture
  - The presence and function of the striated sphincter
  - Assessment of presurgical urethral anatomy.

Urodynamic Testing

- ICS Committee
  - Urodynamic evaluation prior to invasive therapy
- Invasive pressure-flow studies—Gold standard in the incontinent male
  - Detrusor overactivity
  - Impaired detrusor contraction
  - Low abdominal leak pressure
  - Bladder outlet obstruction, and reduced compliance

Management

Table 13B.1: Recommendations for initial treatments for UI in men

	Recommendations	*GR*
•	Lifestyle intervention	NR
•	Supervised pelvic floor muscle training for post prostatectomy SUI	B
•	Scheduled voiding regiments for OAB	C
•	When there is no evidence of significant post-void residual urine, antimuscarinic drugs for OAB symptoms, with or without urgency incontinence	C
•	Alpha-adrenergic antagonists (alpha-blockers) can be added if there is also bladder outlet obstruction	C

Abbreviations: GR, grade of recommendation; NR, no recommendation possible

Source: EAU Guidelines 2009.

Duloxetine—Role in PPI

- Placebo-controlled RCT
- Dose 80 mg
- Mean reduction of incontinence episodes of 52.2% after 12 weeks
- Improvement seen after only 8 weeks
- The side effects:
  - Fatigue (50% vs 13% in the placebo group),
  - Insomnia (25% vs 20%),
  - Loss of libido (19% vs 7%), constipation (13% vs7%),
  - Nausea (13% vs 7%),
  - Diarrhea (13% vs 7%), and drymouth (6% vs 0%)
- These side effects were mild, and most symptoms resolved after a short period.

Surgical Treatment

- Surgical treatment recommended
- Conservative treatment has failed
- No clear data on timing of a surgical intervention
- Behavioral/conservative management
  - Utilized during the first year after incontinence.

Surgical Treatment Options

- Urethral bulking agents
- Male sling
- Artificial urinary sphincter.

Urethral Bulking Agents

- Indication:
  - Poor surgical candidates
  - Mild forms of incontinence (1 pad/day).
- Mechanism:
  - Adding bulk and increasing coaptation at the level of the bladder neck and distal sphincter
- Agents:
  - Dextranomer/hyaluronic acid copolymer (deflux)
  - Pyrolytic carbon microspheres (durasphere)
  - Polydimethylsiloxane (macroplastique)
- Dose: 2.5–5 mL
- Site: At the level of the bladder neck and proximal urethra
- Complication: Post-injection inflammations can cause a frozen urethra.

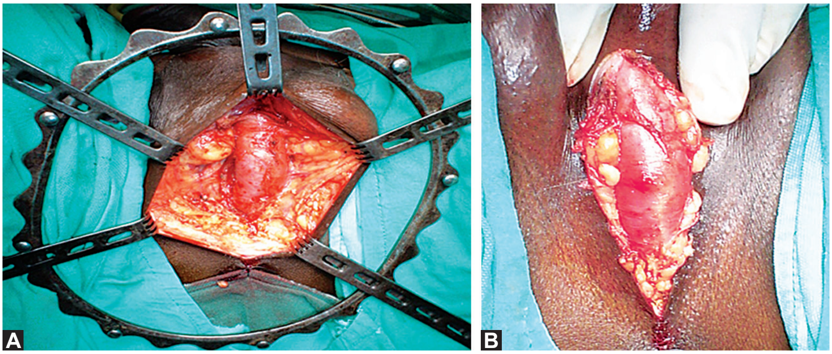
Table 13B.2: Results of recently used bulking agents

Bulking agent and study	*No of patients*	*Results after first injection*	*Side effects*
Macroplastique Kylmala et al (65)	50	After first injection: 12% continent, 56% improved continence After represented injections (max 4): Max 4:60% continent, 24% improved continence, 16% no change	Dysuric complaints
Imamoglu et al (64)	25	After 1–2 injections: 80% mild incontinence, 23% severe inconthence	Two urinary tract injections One urinary retention
Deflux Alloussi (66)	72	After 4–8 weeks; 58% continent, 39% improved	Urinary tract infection
Durasphere Section et al (67)	8	No subjective or objective cure	–

Male Sling

- Indication:
  - Mild to moderate PPI
  - In patients who are unable to operate an AUS device.
- Contraindications:
  - Prior pelvic radiotherapy and/or detrusor overactivity
- Mechanism:
  - Based upon the concept of passive external urethral compression occluding the urethra at rest, and during stress maneuvers

- Prolene (mesh) bulbourethral sling in male incontinence
- Prolene bulbar urethral sling (single bolster)
  – An economically effective option
  – SGPGI experience.



Figures 13B.3A and B: Bulbospongiosus; midline perineal incision

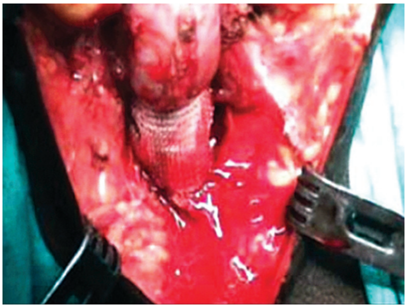


Figure 13B.4: Prolene mesh bulbourethral sling in male incontinence

Source: Indian J Urol. 2007 Jan-Mar; 23 (1):29-32.

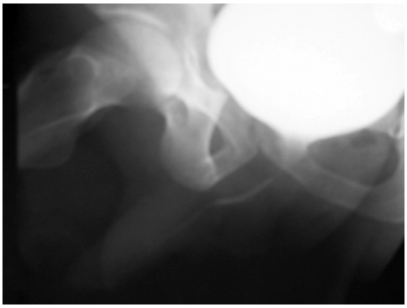


Figure 13B.5: X-ray image

Preoperative and Postoperative Stress Cystograms

- 71% success rate in achieving complete dryness and normal voiding (5/7)
- 86% success rate with use of 1–2 pads per day (6/7).

Expenditure

- Mean cost of the procedure ~ ₹ 20,000
- Cost of AMS 800 ~ > ₹ 180,000 (*Source:* American Medical Systems).

Bone-anchored Sling Systems (The Invance Sling)

- It uses a silicon-coated polyester sling positioned under the bulbar urethra via a perineal incision
- Attached to both ischiopubic rami by three titanium screws

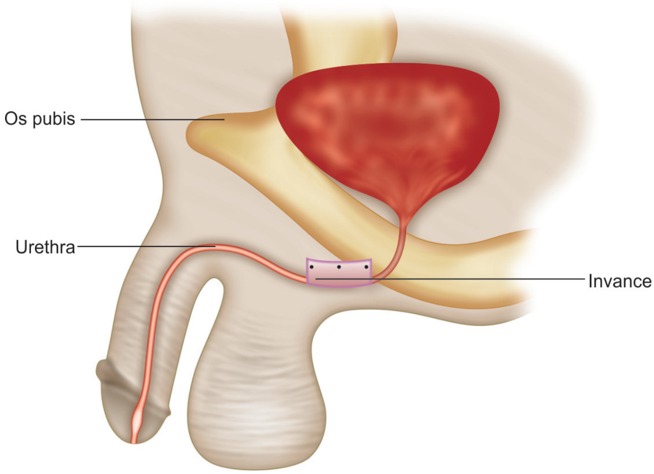


Figure 13B.6: Invance sling

- The pad-free rates range from 36% to 65% in patients with mild to severe SUI
- Complications:
  - Osteomyelitis
  - Pain (76%) related to the bone screws (usually resolves after 3 months).

Retrourethral Transobturator Sling (Advance Sling)

- Relocate the lax and descended supporting structures of the posterior urethra and sphincter region into the former pre-prostatectomy position
- Prerequisite for success include good mobility of the sphincter region and a good residual function of the sphincter with a coaptive zone of >1 cm

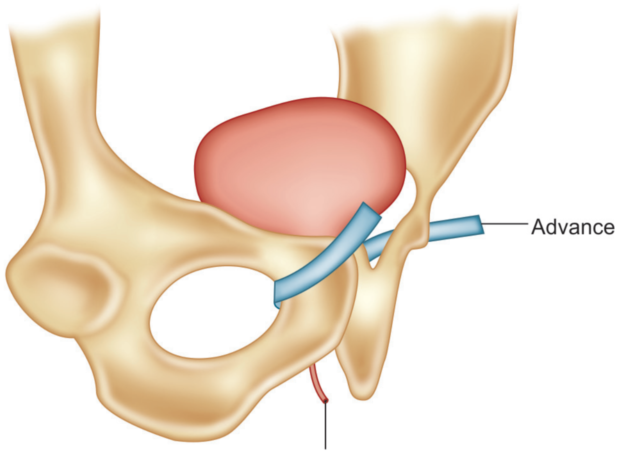


Figure 13B.7: Advance sling

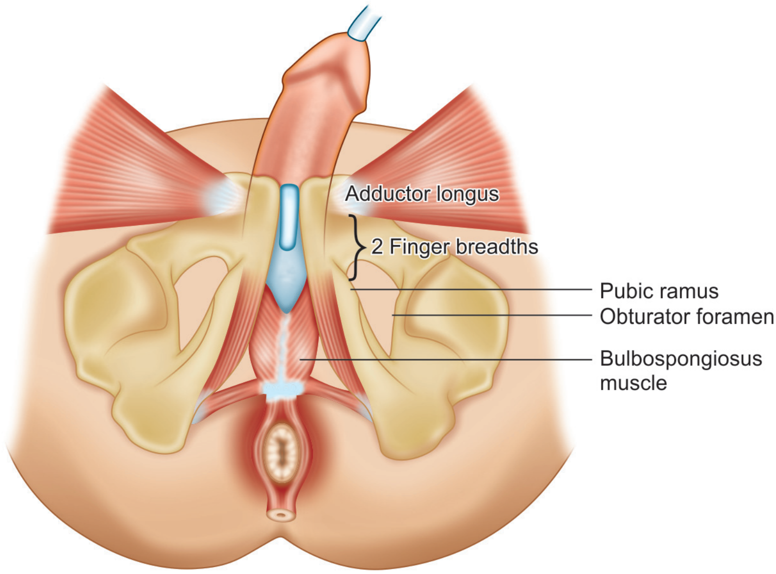


Figure 13B.8: Relevant pelvic anatomy for placement of a transobturator male sling. A midline perineal incision is made. Bilateral stab incisions are made two finger breadths posterior to the adductor longus tendon at the level of the base of the penis

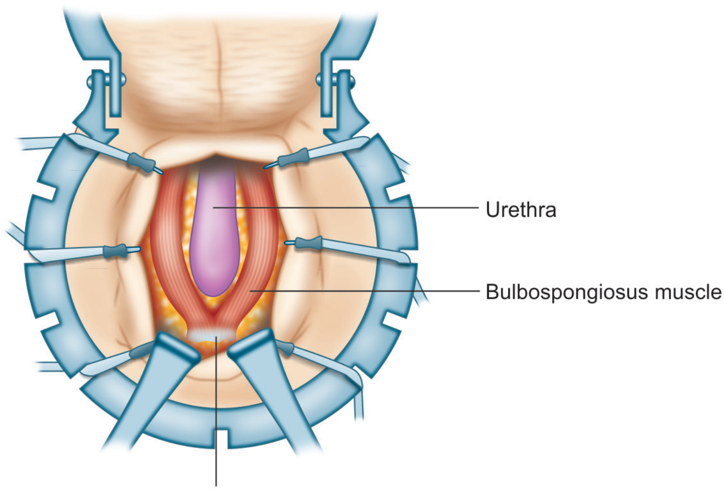
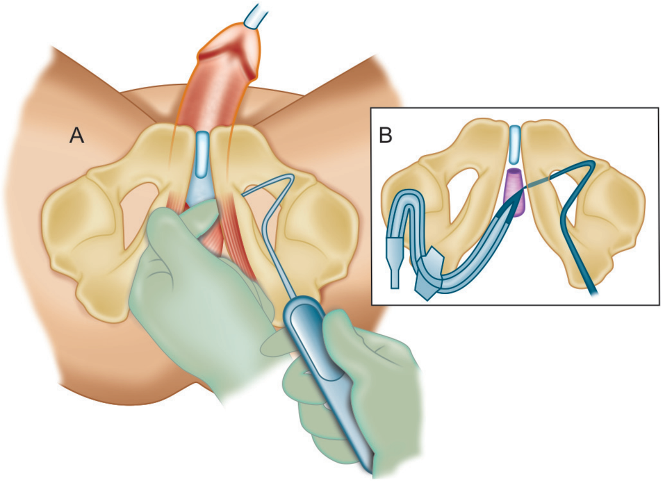


Figure 13B.9: Urethra is identified within the midline perineal incision. The bulbospongiosus muscle is spared. A self-retaining retractor is placed into the incision for exposure



Figures 13B.10A and B: (A) A curved trocar is placed through the stab incision. The descending pubic ramus is encountered and the trocar then angled laterally and passed through the obturator ring with index finger guidance. The trocar follows the index finger into the perineal incision. This process is then repeated on the contralateral side; (B) Each end of the Advance sling is then attached to a trocar eye and brought out through the stab incision

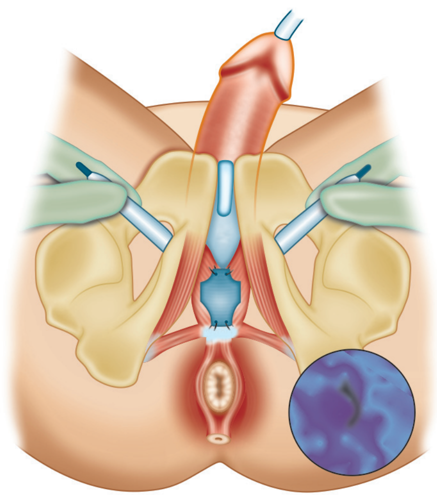
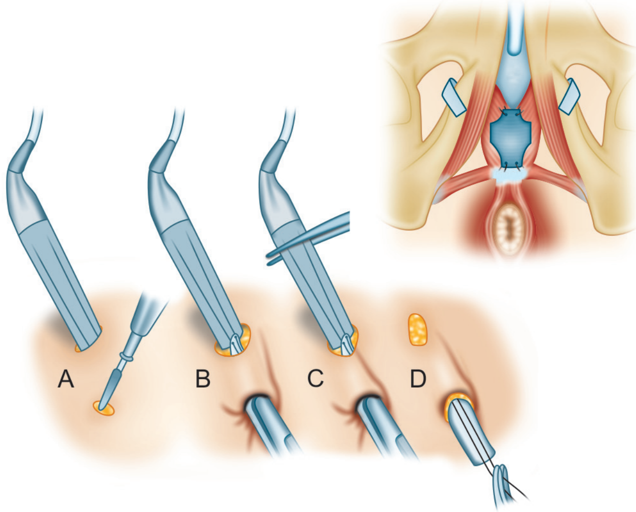


Figure 13B.11: Mesh is placed flatly against the urethra and anchored in four corners with 3–0 Vicryl suture. Urethroscopy is performed, and tension is applied to the ends of the mesh under urethroscopic vision to confirm appropriate coaptation of the sphincteric urethra



Figures 13B.12A to D: (A and B) A superficial stab incision is made 2 cm interomedial to the stab incision bilaterally; (C) Sleeves are removed from each side of the mesh; (D) A right angle is used to create a tunnel and bring the mesh ends out through the inferomedial stab incision. Excess mesh is trimmed at skin level

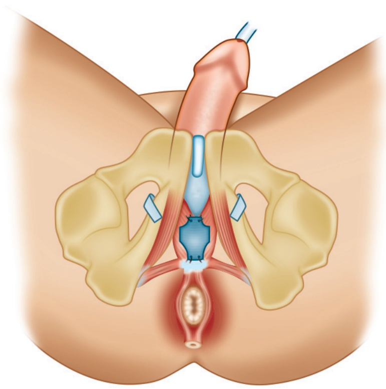


Figure 13B.13: Stab incisions are closed with simple interrupted absorbable suture and the perineal incision in three layers with running absorbable suture

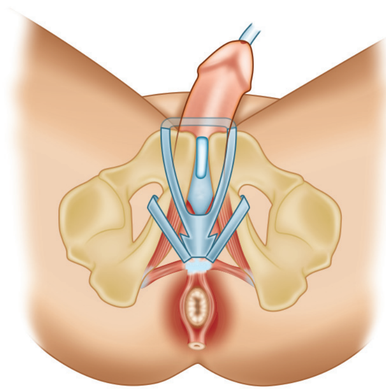


Figure 13B.14: Coloplast Virtue® male sling

Table 13B.3: Results of the adVance sling with a mean follow-up ≥ 12 months

Study	*No of patients*	*Follow-up No.*	*Cure %*	*Improvement %*
Cornu et al (2009) [76]	102	Mean:13	62.7 (no pad)	17.6
Bauer et al (2009) [75]	70	12	51.4 (no pad or one dry security pad)	25.7
Rehder et al (2009) [73]	20	24.3	65 (no pads)	20
Rehder et al (2010) [74]	118	12	73.7 (no pads)	16.9
Bauer et al (2010) [81]	126	27.2	51.6 (no pad or one dry security pad)	23.8
Corneal et al (2010) [77]	35	12	9 (no pad use and < 2 g urine loss/24 h)	45.5
Cornu et al (2010) [32]	136	21	62 (no pads)	16

- In a follow-up period dry rates of up to 70%
- The major complication includes:
  - Transient acute postoperative AUR (up to 21%) requiring temporary recatheterization,
  - Local wound infection
  - Urinary infection with fever.

Readjustable Sling Systems

- Two adjustable sling systems are available with published data:
  - Argus (Promedon,Co´rdoba, Argentina)
  - Remeex (Neomedic, Barcelona, Spain).

Argus Sling

- It is a radiopaque cushioned system with a silicone foam pad for soft compression of the bulbar urethra
- It can be implanted via a retropubic or a transobturator approach.
- A dry rate of 79% was reported in patients with moderate to severe incontinence, and adjustment was required in 38–40% of the cases

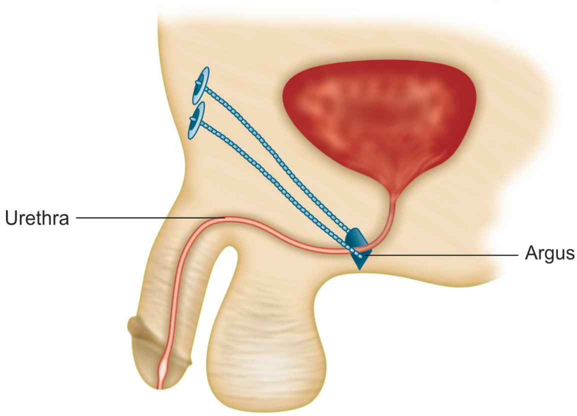


Figure 13B.15: Argus sling

- Complications
  - Transient perineal pain (15%)
  - Sling explantation (8–12%) due to erosion into the urethra, the bladder, and through the abdominal wall and due to infections.

Remeex System

- It is also positioned under the bulbar urethra
- A mesh is connected via two monofilament traction threads to a suprapubic mechanical regulator
- The mechanical regulator is permanently implanted subcutaneously over the abdominal rectus fascia 2 cm above the pubis
- Adjustment is conducted via an external manipulator
- Complications:
  - Intraoperative bladder injuries (up to 11%)
  - Removal of the device (up to 12%) due to infections or urethral erosion.

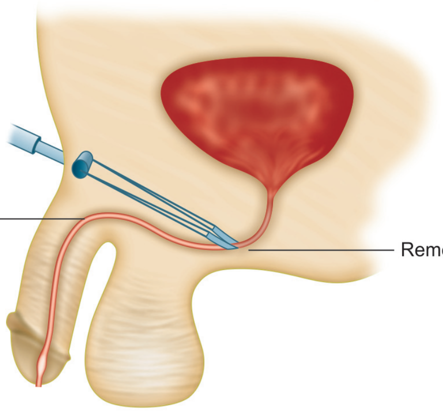


Figure 13B.16: Remeex system

Table 13B.4: Results of the Remeex and Argus sling with a mean follow-up ≥ 12 months

Study	*Type of sling*	*No. of patients*	*Mean follow-up mo*	*Cure %*	*Improvement %*	*Readustments %*
Romano et al (2009) [67]	Argus	48	45	66 (no pads)	12.8	Dry patients 10.4
Hubner et al (2011) [68]	Argus	101	50.4	79.2	5.0	38.6
Sousa-Escandon et al (2004) [71]	Remeex	6	18	83	0	Not specified
Campos-Fernandes et al (2006) [69]	Remeex	18	26.3	55.5	11.1	1x:44
Sousa-Escandon et al (2007) [70]	Remeex	51	32	64.7 (no or one small pad per day	19.6	1x:100>1x:33.3

ProACT System (Uromedica, USA)

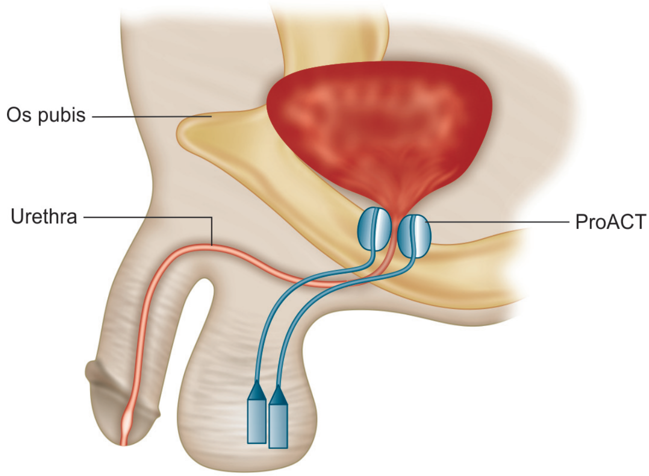


Figure 13B.17: ProACT system

- Consists of a readjustable two balloons placed bilaterally at the bladder neck
- Continence is achieved due to urethral compression
- Reported dry rates are up to 67%
- Published studies show comparatively high complication rates including
  - Device removal (10–30%) due to erosion, deflation, or migration of the balloons and infections.
- TRUS guided implantation seems to be safer with reduced complications rates and shows a better positioning of the balloon.

SUGGESTED READING

1. AUA cooperative study 1992.
2. Cornu JN et al. Duloxetine for mild to moderate postprostatectomy incontinence: preliminary results of a randomised placebo-controlled trial. Eur Urol. 2011.
3. Gomha MA, Boone TB. Voiding patterns in patients with post-prostatectomy incontinence: urodynamic and demographic analysis. J Urol. 2003;169:1766-9.
4. Strasser H. Transurethral ultrasound: evaluation of anatomy and function of the rhabdosphincter of the male urethra. J Urol. Jan 1998.

14

Issues in Benign Enlargement of Prostate: Consensus and Controversies

• Vishwamber Nath

ANTI-ANDROGENS AND INTRAOPERATIVE BLOOD LOSS

What is the Theory

5 α RIs reduce prostatic blood flow by:

i. Down-regulation of VEGF (*BJU Int. 2005;96, 1319–22)*

ii. Reducing sub-urethral prostatic MVD (*J. Urol. 2002;167, 1731–3)*

ANTI-ANDROGENS AND BLOOD LOSS

What is the Evidence—Finasteride

- Significant reduction in bleeding/glioblastoma multiforme resection
- No difference in transfusion rates (*Prostate Cancer Prostatic Dis. 2005;8:215–18; J Urol.2002;168:2024–26)*
- Lower transfusion rates for resections >30 G (*Urology 2000;55:684–89).*

Dutasteride

- No difference in blood loss or MVD with up to 5 weeks pre-treatment (*BJU Int. 2007;99:587–94; Scand. J. Urol. Nephrol. 2009;43:377–82).*

What do 'Guidelines' Say

- "...insufficient evidence to recommend perioperative 5-α RI treatment to reduce hemorrhage .. " (*J Urol. 2011;185:1793–803)*
- Level C evidence for 2–4 weeks pre-treatment with Finasteride in 'selected patients' (*Nat Rev Urol. 2011;8(9):1-11)*

Factors Limiting Routine use of 5αRIs

- Transfusion rates are now consistently low - ~2%, in most contemporary series (*Eur Urol. 2010;58:384–97)*
- It is not always possible to predict which gland is going to become a difficult bloody resection
- Even the slight, possible advantage needs 2–4 weeks pretreatment. (*Nat Rev Urol. 2011;8(9):1-11*)
- Cost/Logistic implications of postponing surgery for so long.

Possible Role

- Large prostate ± anti-platelet drugs (e.g. DES)
  - + Surgery postponed for some intercurrent illness
  - + Non-availability of laser/bipolar, etc.

15

Prostatic Urethral Angle—Myth or Reality

• Ajit Sawant

PROSTATIC URETHRAL ANGLE

- Prostatic urethra is bent tube
- Prostatic urethral angle (PUA) is measured on transrectal ultrasound (TRUS)
  – In midsagittal plane.

PUA—Significance

- Energy is lost while traversing through bent tube
- Energy lost leads to decrease in urine velocity
- PUA is inversely related to UFR
- PUA corelate to BOO Index
- PUA > 35 degree affects voiding score.

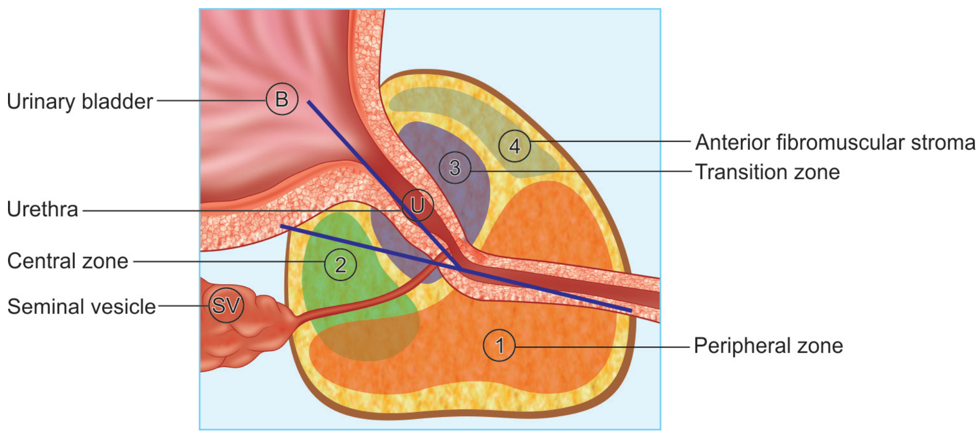


Figure 15.1: Prostatic urethral angle

16

Metabolic Syndrome and Benign Prostatic Hyperplasia

• Vivek Birla

INTRODUCTION

- The pathogenesis of benign prostatic hyperplasia (BPH) is not well understood.
- Aging represents the central mechanism of BPH.

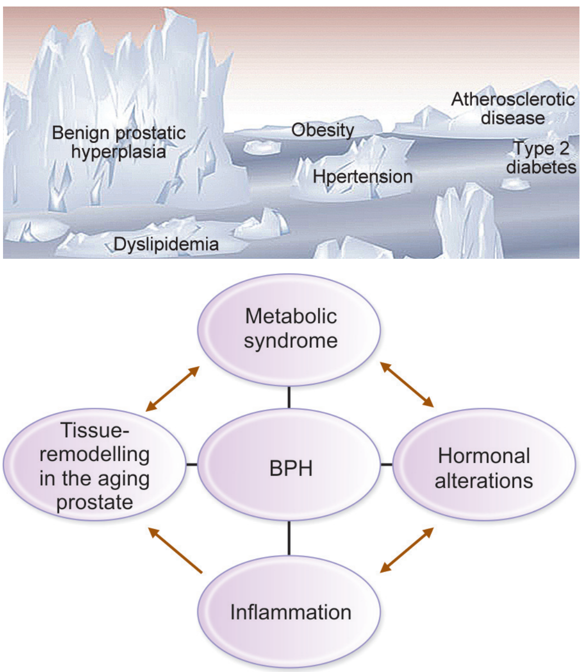


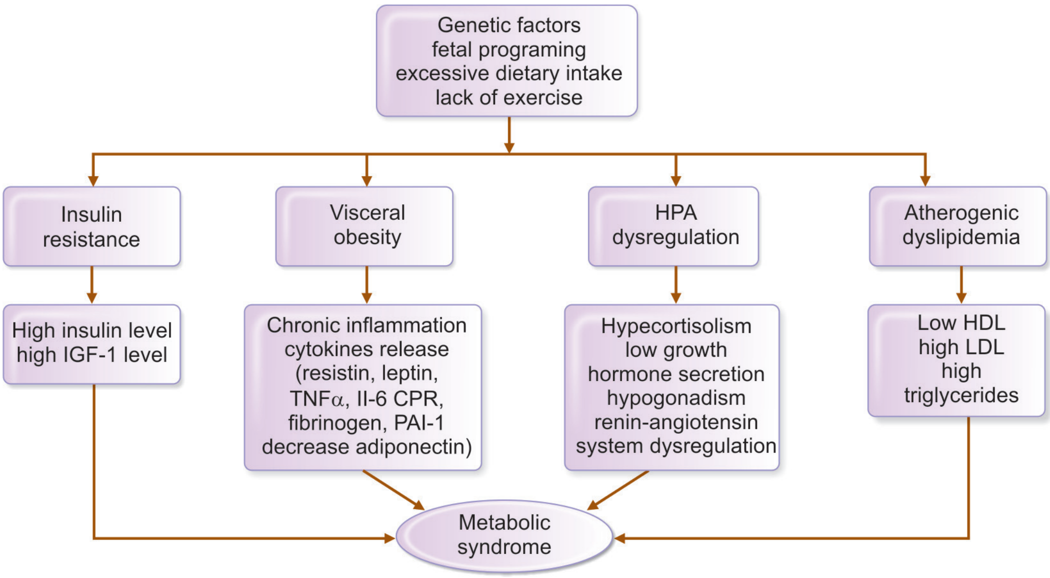
Figure 16.1: Interrelationship of complication in benign prostatic hyperplasia

Metabolic Syndrome

- MetS is a disease process associated with defective insulin-mediated glucose uptake.
- MetS involves a constellation of abnormalities including:
  – Obesity
  – Dyslipidemia
  – Hypertension
  – Insulin resistance
  – Hyperinsulinemia
  – Impaired glucose metabolism.

Pathophysiology of Metabolic Syndrome

Flow chart 16.1: Pathophysiology of metabolic syndrome



Metabolic Syndrome (MetS) Definition

- Definition of MetS according to the National Cholesterol Education Program adult treatment panel III (2005 revision).

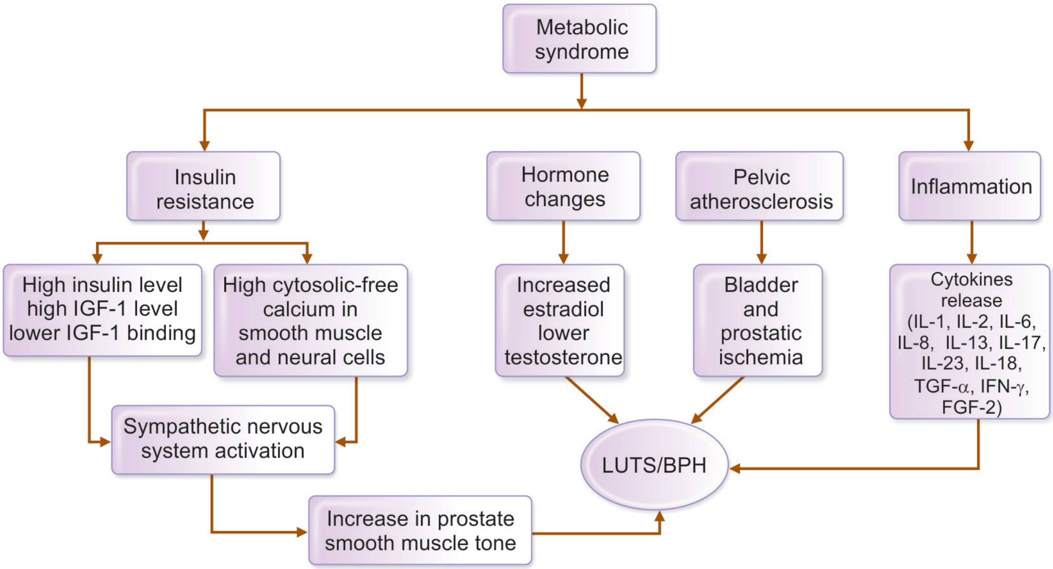
Table 16.1: Criteria for metabolic syndrome

Criteria[a]	
1.	Abdominal obesity (for men, waist circumference > 102 cm)
2.	Hypertriglyceridemia (> 1.69 mmoL/1;> 150 mg/dl) or treatment)
3.	Low high-density lipoprotein cholesterol (for men, <104 mmoL/1;< 40 mg/dL) or treatment
4.	High blood pressure (> 130/85 mmHg) or teatment
5.	High fasting glucose (> 6.1 mmoL/1;110 mg/dL) or treatment

[a]The presence of three or more pathologies is necessary to make a diagnosis of metabolic syndrome

Metabolic Syndrome and Benign Prostatic Hyperplasia

Flow chart 16.2: Metabolic syndrome and benign prostatic hyperplasia



- Hammarsten et al were the first to demonstrate that noninsulin-dependent diabetes mellitus (NIDDM), hypertension, obesity, and low high-density lipoprotein cholesterol (HDL-C) levels constitute risk factors for the development of BPH.

Obesity and Benign Prostatic Hyperplasia

- Dahle et al, examined the relationship between waist-to-hip ratio and LUTS in 502 Chinese men.
- In their analyses, individuals with a waist-to-hip ratio of ≥ 92% had a 2.0-fold (p=0.01) higher risk of BPH compared with their counterparts with a waist-to-hip ratio of ≤ 85%.

Metabolic Syndrome and Urology

A more recent notion is that the metabolic syndrome is linked to other important clinical conditions in urology, such as male hypogonadism, nephrolithiasis, overactive bladder (OAB) and erectile dysfunction (ED).

Benign Prostatic Hyperplasia—A Lifestyle Disease

- Healthy heart = Healthy normal prostate.
- Old is gold.
- Enjoy healthy lifestyle.
- Stay away from urologist.

17

Sterilization of Endoscopic Equipment

• Girish Nelivigi

Table 17.1: Spaulding classification of devices

Device	*Definition*	*Risk of infection*	*Reprocessing required*	*Example*
Critical	Device that enters a normally sterile tissue	High	Sterilization	Cardiac catheter, implants, needle
Semi-critical	Device that contacts mucous membrane or non-intact skin	High or intermediate	Sterilization desirable; HLD acceptable	Some endoscopes; manometry probes
Non-critical	Device that contacts intact skin	Low	ILD or LLD	BP cuff; stethoscope

STEPS IN STERILIZATION

- Cleaning
- Sterilization/disinfection.

Accepted Disinfectants

- Glutaraldehyde
- Autoclave
- Ethylene oxide (ETO)
- Ortho-phthalaldehyde (OPA)
- H_2O_2
- Peracetic acid.

Not Recommended

- Formalin chamber
- Iodophores
- Alcohol based

- HIV/HCV/HBV/M.TB infection have to be managed in the same way
- CDC guidelines.

Glutaraldehyde

- Commonly available as Cidex, Tridex, etc.
- Optimum concentration—2 to 3.2%
- Aqueous solutions are acidic and not sporicidal
- Activated by alkalinizing to pH 7.5–9.0
- Mode of action: Alkylation of sulfhydryl, hydroxyl, carboxyl and amino groups
- Shelf life: 14–28 days
- Sterilization time: 10 hours at 20–25°C
- High level disinfection time: 20 minutes of 2% solution at 20°C.

Advantages

- Active in the presence of organic matter
- Excellent biocide
- Good material compatibility
- Non-corrosive
- Compatible with lensed instruments
- Moderate residual activity.

Disadvantages

- Coagulates blood and fixes proteins to surfaces
- Diluted solutions have limited shelf life
- pH and temperature dependent
- Pungent odor, irritant to skin, eyes and respiratory tract
- Relatively costly.

Ortho-phthalaldehyde (Glutaraldehyde OPA)

0.55% 1,2-benzene dicarboxaldehyde.

Advantages Over Glutaraldehyde

- More stable
- Wider pH range
- No activation
- Odorless
- Less irritant
- More rapid mycobactericidal
- Does not coagulate blood or fixes tissues to surfaces.

Disadvantages

- Stains proteins and skin gray
- Eye irritant
- Expensive
- Slow sporicide.

H_2O_2 Gas Plasma Sterilization

- Principle: H_2O_2 in vacuum, excited by RF/MW energy.
- Produces free radicals, which inactivate enzymes and nucleic acids.
- Achieves 10-6 sterility assurance in 55 minutes.

Figure 17.1: H_2O_2 gas plasma sterilization system

Advantages

- By-products are nontoxic
- Items can be used immediately
- No aeration
- Simple to install, operate and monitor
- Good material compatibility
- Low sterilization temperature
- Fast cycle.

Disadvantages

- Not suitable for long narrow lumen devices
- Some nylons and nickel alloys not compatible
- Linens and liquids not compatible
- Costly consumables
- Small sterilization chamber
- Items to be dry.

Peracetic Acid (STERIS)

- Low temperature chemical sterilization process
- Content: 35% peracetic acid
- Principle: Oxidizing agent (denatures proteins, and disrupts cell walls).

Advantages

- Low temperature sterilization
- Highly biocidal
- Non-toxic
- Effective in presence of organic matter
- Rapid cycle

- Non-toxic byproducts
- Compatible with flexiscopes.

Disadvantages

- Not amenable for storage
- Only immersible instruments
- No suitable biological indicators
- Skin and eye toxicity
- Highly corrosive
- Relatively costly.

Ethylene Oxide (ETO)

- Gaseous low temperature sterilant
- Mode: Alkylation of proteins, RNA, DNA
- Variables: Gas concentration, temperature, relative humidity, vacuum, pressure, exposure time
- Compounds:100% ETO, ETO with CO_2

Advantages

- Good material compatibility
- Penetrates packaging materials and lumens
- Cartridge system prevents excess exposure
- Simple to operate and monitor.

Disadvantages

- Flammable
- Toxic
- Potential carcinogenic
- Lengthy cycle
- Costly
- Irritant to eyes, skin, respiratory tract, etc.

SUMMARY

- Cleaning instruments immediately after surgery is as important as the actual sterilization process itself
- Sterilization is the goal. However, high level disinfection is also acceptable as a 2nd choice
- Even now steam sterilization is the best way of sterilization
- Endscopy instruments are best sterilized by Sterad, Glutaraldehyde, ETO and Steris.

SUGGESTED READING

1. CDC, Guidelines for disinfection and sterilisation in healthcare facilities, 2008
2. Mathur P. Hospital Acquired Infections: Prevention and Control, Williams and Wilkins, Lippincott 2010.
3. www.fda.gov/cdrh/ode/germlab.html.

18

Persistent Hematuria: Causes and Management

• PB Singh

UNCONTROLLED BLEEDING AFTER SURGERY

- With induction of bipolar TURP, plasma button, lasers such incidence is much less.
- Majority of urologists are still using TURP as gold standard and bleeding is a concern.
- This chapter is based on my experience and problem faced by me in last 30 years.
- It is a practical approach to young urologist to manage uncontrolled bleeding.

HEMORRHAGE IN TRANSURETHRAL RESECTION OF THE PROSTATE

- Primary hemorrhage
- Reactionary hemorrhage
- Secondary hemorrhage.

Primary Hemorrhage

This occurs during TURP when we are not getting clear urine at the end of procedure.

Causes

- An arterial bleeder not coming in view—usually at bladder neck where spurter is towards bladder
- Residual tissue and bleeders in hidden behind
- Opening of deep venous sinuses
- Too thin capsule leading to generalized oozing.

Management Options

- Locate site of bleeding. Go near capsule and inspect total fossa in clockwise manner. If still vision is not good due to poor return, Router's cannula or SPC tube may be inserted for continuous irrigation.
- Fulgurate bladder neck circumferentially with ball electrode with spray coagulation.
- If no active bleeder and found sinuses, do not waste time in too much fulguration.

- Insert 3-way Foleys catheter, inflate balloon more than size of fossa and give traction.
- Bleeding usually stops if bleeding only from sinuses and maintain it for 24 hours but may be prolonged.
- If no control of bleeding in spite of waiting for sufficient time, it may be due to opening of deep sinuses.
- Deflate balloon and inflate only 5–10 cc and pull balloon in fossa, at sphincter it will give a resistance. Inflate balloon in fossa as per approximate capacity and observe bleeding. Majority cases it works and after 24 hours balloon can be deflated, pushed in bladder and inflated with or without traction.
- If all above options fails to control bleeding, without wasting time open bladder and see for any bleeder and coagulate.
- Inspect fossa thoroughly and see for any obvious bleeder. If generalized oozing, pack the fossa with long bandage soaked in betadine solution around Foleys catheter. Take one end of bandage out through suprapubic wound. Close bladder over a suprapubic tube.
- Maintain it for 24 to 48 hours and if vital stable and bleeding under control, packing may be removed.
- Apart from above management options following measures have to be taken
- Vital to be preserved by IV fluid, blood transfusions and antibiotics
- Rule out any bleeding diathesis. Take history of aspirin or antiplatelets, which may have been missed and manage accordingly.

Reactionary Hemorrhage

- This usually occurs in postoperative period when patient has been shifted from OT.
- This happens if some of the bleeders have reopened, or traction has become loose in cases where sinuses were opened.

Management

- First check, irrigation is going on properly with good return.
- See traction, give traction and see the result.
- Some time balloon slips into fossa and stretching capsule results in constant oozing. Deflate balloon, push catheter in fossa, reinflate and give traction.
- If not controlled, shift patient in OT, reinspect fossa and coagulate any bleeder.
- Further steps are same as primary hemorrhage.

Secondary Hemorrhage

- Usually occurs around 10th postoperative day and is because of infection.
- Admit patient and start broad-spectrum antibiotics. My preference is amikacin with 3rd generation cephalosporin.
- Get USG to see for clots.
- Put 3-way catheter and start irrigation after flushing catheter for removing small clots
- Majority cases are managed by these techniques but if patient has significant clots, shift patient for clot evacuation and follow steps as done in primary hemorrhage.

19

Prolonged Catheterization Problems and Urinary Tract Infection

• Suresh Patankar

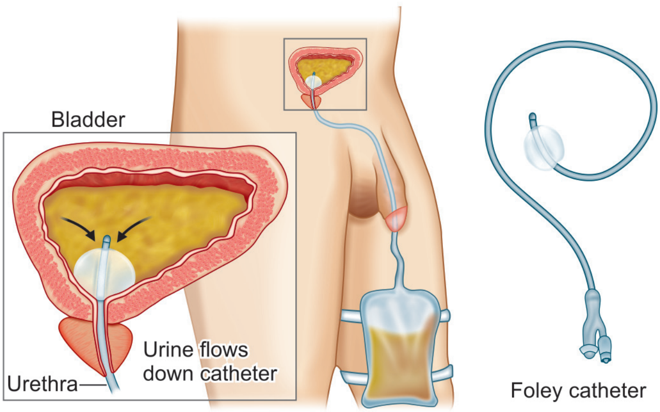


Figure 19.1: Prolong catheterization and urinary tract infection (Guidelines based on EAU recommendation)

CLASSIFICATION OF UTI/UROSEPSIS

Based on:
- Anatomical level of infection
- Grade of severity of infection
- Underlying risk factors
- Microbiological findings.

Anatomical Level of Infection

Urethritis
- Cystitis
- Pyelonephritis
- Sepsis.

Grade of Severity of Infection

1: Low: Cystitis
2: PN: Moderate
3: PN: Severe, established
4: US: SIRS
5: US: Organ dysfunction
6: US: Organ failure.

Underlying Risk Factors

Number of risk factors

- Recurrent UTI
- Extra-urogenital
- Nephropathy
- Urological
- Catheter/stent.

Pathogens

Species

- Susceptibility grade
- Susceptible
  - Reduced susceptibility
  - Multiresistant.

Complicated UTI

- Infection associated with a condition, such as structural or functional abnormality of the genitourinary track or the presence of an underlying disease that interferes
- Two criteria (Positive urine culture + factor listed below):
  - Presence of an indwelling catheter, stent or use of intermittent bladder catheterization
  - PVR > 100 mL
  - Obstructive uropathy of any etiology
  - VUR or other functional abnormalities
  - Chemical or radiation injuries of uroepithelium
  - Urinary tract modification—ileal loop or pouch
  - Peri/postoperative UTI
  - Renal insufficiency and transplantation,diabetes mellitus and immunodeficiency.

Urine Cultures

- **Specimen collection**
  - Prevention of contamination by normal, vaginal, perineal and anterior urethral flora
  - Collection of urine from catheters or bag should be avoided
  - Though suprapubic aspiration is gold standard it is not a practical method
  - Midstream urine or a clean catch urine is recommended.
- Significant bacteriuria in a complicated UTI is defined by counts of > 10^5 cfu/mL and > 10^4 cfu/mL, in the MSU of women and men, respectively. If a straight catheter urine sample is taken, > 10^4 cfu/mL can be considered relevant.

- For an asymptomatic patient, two consecutive urine cultures (at least 24 hours apart) yielding > 10^5 cfu/mL of the same microorganism are required. The requirement for pyuria is > 10 WBC per high-power field (x 400) in the resuspended sediment of a centrifuged aliquot of urine or per mm^3 in unspun urine.
- A dipstick method can also be used for routine assessment, including a leukocyte esterase test, hemoglobin and probably a nitrite reaction.

Microbiology

- A broad range of bacteria can cause a complicated UTI. The spectrum is much larger than with an uncomplicated UTI and the bacteria are more likely to be antibiotic-resistant (especially in a treatment-related complicated UTI) than those isolated in an uncomplicated UTI.
- *Escherichia coli, Proteus, Klebsiella, Pseudomonas, Serratia* species and enterococci are the usual strains found in cultures. Enterobacteriaceae predominate (60–75%), with *E. coli* as the most common pathogen, particularly if the UTI is a first infection.
- Otherwise, the bacterial spectrum may vary from time to time and from one hospital to another.

Antimicrobial Treatment Options for Empiric Therapy

Antibiotics recommended for initial empirical treatment:
- Fluoroquinolones
- Aminopenicillin plus a BLI
- Cephalosporin (Groups 2 or 3a)
- Aminoglycoside.

Antibiotics recommended for empirical treatment in case of initial failure or for severe cases:
- Fluoroquinolone (if not used for initial therapy)
- Ureidopenicillin (piperacillin) plus BLI
- Cephalosporin (Group 3b)
- Carbapenem
- Combination therapy:
- Aminoglycoside + BLI
- Aminoglycoside + fluoroquinolone.

Antibiotics not recommended for empirical treatment:
- Aminopenicillins, e.g. amoxicillin, ampicillin
- Trimethoprim-sulfamethoxazole (only if susceptibility of pathogen is known)
- Fosfomycin trometamol
- BLI = β-lactam inhibitor.

SUMMARY OF RECOMMENDATION FOR CATHETER ASSOCIATED UTIs

- Indwelling catheter should be introduced under aseptic conditions.
- Urethral trauma should be minimized by the use of adequate lubricant and the smallest possible catheter caliber.
- Catheter system should remain closed.
- Duration of catheterization should be minimal.
- Topical antiseptics or antibiotics applied to catheter, urethra or meatus not recommended.
- Benefits from prophylactic antibiotics and antiseptics have never been established.

- Chronic antibiotic suppressive therapy is not recommended.
- Catheter should be changed in intervals.
- While the catheter is in place, systemic antimicrobial treatment of asymptomatic catheter-associated bacteriuria is not recommended, except in certain circumstances: especially prior to traumatic urinary tract interventions.
- In case of asymptomatic candiduria, neither systemic nor local antifungal therapy is indicated, but removal of the catheter or stent should be considered.
- Antimicrobial treatment is recommended only for symptomatic infection.
- In case of symptomatic catheter associated UTI, it may be reasonable to replace or remove the catheter before starting antimicrobial therapy if the indwelling catheter has been in place for more than 7 days.
- In appropriate patients, suprapubic, condom drainage system or intermittent catheter are preferable to indwelling urethral catheter.
- There is little evidence suggesting that antibiotic prophylaxis decreases bacteriuria in patients using intermittent catheterization, therefore it is not recommended.

UROSEPSIS

- Urosepsis is diagnosed when clinical evidence of infection is accompanied by signs of systemic inflammation.
- Patients with urosepsis should be diagnosed at an early stage, especially in the case of a complicated UTI.
- The systemic inflammatory response syndrome, known as SIRS (fever or hypothermia, hyperleukocytosis or leukopenia, tachycardia, tachypnea), is recognized as the first event in a cascade to multiorgan failure.
- Mortality is considerably increased when severe sepsis or septic shock are present, though the prognosis of urosepsis is globally better than sepsis due to other infectious sites.
- The treatment of urosepsis calls for the combination of adequate life-supporting care, appropriate and prompt antibiotic therapy, adjunctive measures (e.g. sympathomimetic amines, hydrocortisone, blood glucose control, recombinant activated protein C) and the optimal management of urinary tract disorders.
- The drainage of any obstruction in the urinary tract is essential as first-line treatment.

CONCLUSION

- Until predisposing factors are completely removed, true cure (i.e. without recurrent infection) is usually not possible.
- Correction of these abnormalities must be performed, whenever possible, as an essential part of treatment.
- Recurrent infection is the rule when the underlying urological abnormality cannot be removed: either relapse (e.g. with the same microorganism) or a re-infection (e.g. with a new microorganism).
- For this reason, a urine culture has to be carried out between 5 and 9 days after the completion of therapy and repeated between 4 and 6 weeks later.

20

Transurethral Resection of the Prostate: Immediate Postoperative Concerns

• Hemant Pathak • Ravindra B Sabnis

CASE 1

History

- An 80-years-old male.
- Complaining of lower urinary tract symptoms (LUTs) (3,2,2,4,4,4,3).
- Known case of hypertension (HTN).
- Palpable abdomen—Bladder not palpable.
- Digital rectal examination—Gr II prostate, benign.
- Renal function test (RFT)—Within normal limit (WNL).
- Urine routine and microscopy—Within normal limit (WNL).

Underwent TURP

- Catheter removed on postoperative day 3.
- Started experiencing severe stress and urgency leak—not responding to conservative management and physiotherapy since 3 months.
- Developed scrotal excoriation (quality of life worse than preoperative status).

Urodynamics

- Filling phase.
- Voiding phase.
- Role of pelvic floor muscle training (PFMT)/faradic stimulation.
- Role of anticholinergics.
- Role of duloxetine hydrochloride.

Incontinence

- Early incontinence may occur in up to 30–40% of patients.
- However, late iatrogenic stress incontinence occurs in fewer than 0.5% of patients.
- Early management.

- Early incontinence is usually urgency incontinence, either because of irritative symptoms such as fossa healing and associated UTI or detrusor instability caused by long-lasting BPH
- Symptomatic treatment should include time-limited anticholinergic drugs.

Urodynamic Evaluation

Incontinence that persists longer than 6 months requires complete investigation, including
- Cystourethroscopy
- Urodynamic evaluation.

There are several causes of incontinence:
- Sphincter incompetence (30%)
- Detrusor instability (20%)
- Mixed incontinence (30%)
- Residual adenoma (5%)
- Bladder neck contracture (5%)
- Urethral stricture (5%)
- Late management
- Pelvic floor exercise combined with biofeedback and electrostimulation
- Duloxetine (40 mg bid) must be balanced against the side effects, which cause patients to discontinue use
- Artificial sphincter might be indicated for a few patients.

CASE 2

History

- A 62 year-old-male, not a known case of (k/c/o) any major ailment
- TURP done 2 days back
- Had intraoperative bleeding
- Continued into the postoperative period
- Failed to respond to conservative management
- Blood transfusion—2 units were given
- Patient was transferred for further management.

Examination

- General examination
  - P – 122/m, BP – 100 mm Hg (SBP)
  - Pallor (++)
  - Irritable, afebrile.
- Physical examination
  - Soft, nontender
  - Bladder not palpable.
  - PUC-in-situ – e/o hematuria, clots in urine bag.
- Digital rectal examination – Gr I prostate.

Laboratory findings

- Hb – 7 g%, hematocrit – 30
- Serum creatinine – 1.8

- LFT – WNL
- BTCT, PT INR – WNL
- Preoperative PSA – 3.3 ng/mL.

USG

- Biliary upper tracts normal.
- UB–partially distended, multiple ecogenic density s/o clots.
- No e/o free fluid.

How Would You Manage?

- Intraoperative bleeding
- Patient was shifted towards and thereafter had severe hematuria
- Patient was discharged and came to casualty after 3 weeks with gross hematuria.

Hematuria

- Arterial bleeding can be more pronounced in cases of preoperative infection or urinary retention because of a congested gland
- Anti-androgen pretreatment with finasteride/dutasteride may reduce bleeding
- Venous bleeding generally occurs because of capsular perforation and venous sinusoid openings
- The amount of intraoperative bleeding may depend on gland size and resection weight.
- Obstructing clots should generally be evacuated
- The balloon catheter should then be replaced under rectal palpation
- The balloon can be either blocked in the fossa or inflated in the bladder (20–40 cc more than the resection weight) and put under traction
- However, this technique does not work with active arterial bleeders, particularly at the bladder neck
- If the irrigation fluid does not clear in the recovery room, immediate reintervention with tamponade evacuation and bleeder coagulation is required to minimize the risk of further complications
- Occasionally, associated coagulation disorders that were undetected preoperatively may not respond to coagulation alone
- Another alternative is transfemoral superselective embolization.

CASE 3

History

- A 74-year-old male, not a k/c/o any major illness.
- H/o AUR—1 month ago.
- DRE—Gr II prostate, clinically benign.
- RFT—WNL
- PSA—3.8.

Underwent TURP

- Catheter removed on postoperative day 3
- Fails to void.

How to Proceed?

- Causes for retention
- How would you manage?

Role of UDS?

Urinary Retention

- Urinary retention (3–9%) is mainly attributed to primary detrusor failure rather than to incomplete resection
- One should be conservative about early repeated TURP in cases of persistent residual urine (RU) or micturition problems
- TURP should be postponed until the fossa heals
- RU may persist above 100 cc for a significant amount of time without presenting a problem to the patient, particularly in cases of previous detrusor decompensation
- In those with SPC, it is removed once RU is <150 cc.

CASE 4

History

- A 60-year-old male, diabetic
- H/o—LUTS since 6 months
- Poor flow and significant PVR
- Cystometry—good bladder contractility.

Underwent TURP

- Had uneventful recovery
- Presented with dysuria and fever after 6 weeks
- Blood sugars were normal
- USG—PVR 150 cc
- Received antibiotics as per culture report
- Responded and had recurrence of dysuria and fever.

What Next?

- Possible causes
- Management.

Infection

- Risk factors included
- Preoperative bacteruria
  - In cases of indwelling catheters, antibiotic prophylaxis is recommended.
  - Low dose prophylaxis in those with recurrent UTI.

21

Lasers for BPH: Which One to Buy?

• Anil Varshney

Figure 21.1: Diode laser

Diode Laser

- LIFE™ (Laser induced flow enhancement) laser therapy using the Evolve™ Laser 150 by biolitec AG
- Depth of penetration is 4–5 mm
- The 980 nm wavelength provides the highest combined absorption in water and hemoglobin
- Excellent vaporization and hemostasis
- Shortens the treatment time.

Diode Laser (Diolep)

Advantages

- Hemostatic; may be used on fully anticoagulated patients
- Normal saline as irrigating fluid
- No prostatic size limit
- Decreased catheter time, blood loss, hospital stay
- Comparative results with standard TURP.

Disadvantages

- Increased procedure time
- Initial cost
- Steep learning curve
- Higher incidence of bladder neck contractures/erectile dysfunction.

Enucleation v/s Vaporization

- Enucleation is done with bare fiber which can be reused.
- Vaporization is done with side fiber and in large prostate more than 1 fiber is required.
- Morcellator is required after enucleation, which adds to the operation time and cost.
- No tissue is available following vaporization.

Energy Efficient 100 w Holmium Laser

- One can achieve precise dissection in the correct plane owing to pulsed nature.
- Other lasers are “trying to achieve” the correct plane.
- In the bargain
- At some places you leave charred tissue which is responsible for irritative symptoms.
- Where, on the capsule you are scared of cutting larger blood vessels (compared to holmium’s dissecting capabilities where all vessels are nicely identified and coagulated).
- AUA, 2012 reports 22% incidence of erectile dysfunction following thulium.

HoLEP (Holmium Laser Enucleation of the Prostate)

Table 21.1: Comparison of PSA changes following HoLEP, TURP and green light PVP

Procedure	*Number of patient*	*Mean % PSA reduction*	*PSA follow-up time (Mean)*
HoLEP			
Tinmouth, et al	509	81.7–86%	6 months
Kuo, et al	48	91.7%	5 months
Elazayat, et al	225	89.9%	6 months
TURP			
Aus, et al	190	70%	3–4 months
Green Light PVP			
Te, et al	77	31.4%	12 months
Sandhu, et al	14	43.6%	

HoLEP Outcomes in Large Prostates

- Kuo, et al. J Urol, 2003;170:149.
- Elzayat, et al. Eur Urol, 2006;29:87.
- Maltaga, et al. BJU int. 2006;197: 81.
- Kuntz RM. Presented at EAU, Berlin, 2007.

Table 21.2: HoLEP outcomes in large prostate

Number of patient	*Mean pre-operative prostate*	*Mean enucleated tissue weight (g)*	*Mean operative time (min)*	*Mean hospital stay (days)*	*Mean catheter time (days)*	*Volume (cc)*
Kuo, et al	*108*	*>75*	120.6	166.8	1.2	–
Elzayat, et al	*225*	*126.4*	86.5	117.6	1.2	1.3
Maltaga, et al	*86*	*>125*	140.2	128.1	1.1	0.6
Kuntz RM	*60*	*115*	93.7	135.9	2.0	1.0

Key Points:

- Very large glands, which in the past would require staged TURP or open simple prostatectomy can be treated with HoLEP.
- Patients with large glands still have minimal hospital stays and catheter times with HoLEP.

Table 21.3: Holmium versus KTP

Holmium uses saline as irrigating fluid, which reduces the possibility of fluid absorption	PVP uses water as irrigating fluid, therefore fluid absorption is more
Superior wavelength of 2064 nm for incising soft tissues	Wavelength of 532 nm for incising soft tissues
Holmium provides a what-you-see-is-what-you-get tissue effect	PVP penetrates deeper and extend below the visible tissue surface
Holmium YAG laser is highly absorbed by tissue water and causes rapid vaporization of exposed soft tissue	PVP has been uniformly characterized by long absorption length in soft tissue, thus poor absorption by tissue water. It provides, predominantly thermal coagulative effects rather than vaporization
Hemostasis with holmium is remarkably good. Its localized coagulation effect 'seals the tissue and provides hemostasis superior to electrocautery instruments without producing deeper thermal injury	Because of deeper penetration deeper thermal injury is associated with PVP

Vaporization (KTP or LBO)

Efficacy

- In 2006, International green light users (IGLU) group was formed by the nine leading centers with extensive experience in KTP laser vaporization.The study group concluded:
  - Long-term efficacy data are still lacking.
  - Durability of the procedure still needs to be assessed.
- Qmax > 20 mL/sec was achieved at 1 year for both prostates < 80 mL and > 80 mL (Pfitzenmaier, et al).
- Relief of obstruction was equivalent to TURP at 1 year (Bouchier-Hayes, et al).
- Better functional results in TURP arm for prostates >70 mL (Horasanli, et al).
- Prostate volume reduction = 40% (preoperative 134 mL to 75.9 mL).
- Medium term data for disobstruction by KTP vaporization for <70 years and >70 years shows greater increase in former group.

- The increase in Qmax, however was greater after TURP in both categories and was statistically significant at 1,3 and 6 months follow-up.
- Postoperative storage symptoms up to 25.7% are usually self-limiting—resolving in 3 months either spontaneously or with antibiotics/anti inflammatory agents, however higher than reported for standard TURP.

Vaporization (Medium to Long-term Morbidity)

- Long-term data still scanty.
- Safe intervention with low medium-term morbidity.
- Urethral stricture 0–5.1%.
- Bladder neck contracture 0–6.8%.
- Reoperation rate for residual prostate
  - Range 6.7% at 24 months
  - 17.9% at 6 months
  - For larger prostates >70 mL.

Objective

Determine the contemporary status of TURP and of the currently most commonly used transurethral minimally invasive surgical therapies (MISTs).

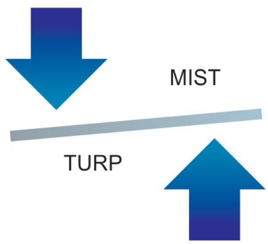


Figure 21.2: Comtemporary status of TURP and MIST

MISTs

- Bipolar TURP
- Bipolar transurethral vaporization of the prostate (bipolar TUVP)
- Holmium laser enucleation of the prostate (HoLEP)
- Potassium-titanyl-phosphate (KTP)/PVP laser vaporization of the prostate.
- Thulium : Vaporesection.

Meta-analysis of Functional Outcomes (MISTs vs TURP)

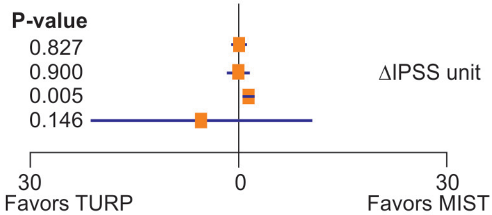
International Prostate Symptom Score (IPSS)

- Most prominent change → HoLEP ($p = 0.005$)
- Remaining MISTs → statistically comparable.

Forest Plot for International Prostate Symptom Score

IPSS

Method	Mean difference	CI	P-value
Bipolar TURP vs TURP	0.094	(–0.907—1.094)	0.827
Bipolar TUVP vs TURP	–0.060	(–1.458—1.338)	0.900
HoLEP vs TURP	1.309	(–0.747—1.870)	0.005
KTP vs TURP	–5.377	(–21.352—10.598)	0.146



Meta-analysis of Functional Outcomes (MISTs vs TURP) QoL
↓ IPSS QoL index

Bipolar TURP
Bipolar TUVP
HoLEP

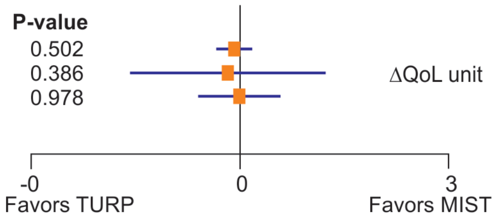
~

TURP

(p>0.3)

QoL

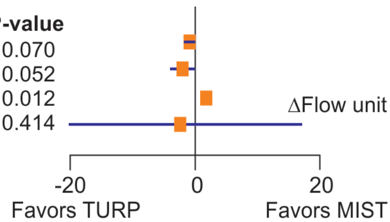
Method	Mean difference	CI	P-value
Bipolar TURP vs TURP	–0.100	(–0.507—0.312)	0.502
Bipolar TUVP vs TURP	–0.286	(–2.806—2.234)	0.386
HoLEP vs TURP	–0.003	(–0.971—0.966)	0.978
KTP vs TURP			



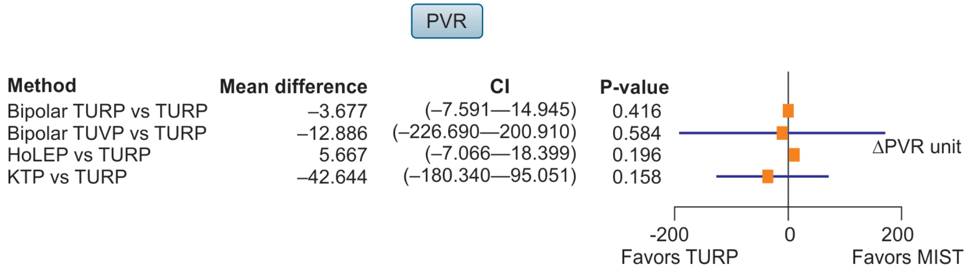
Meta-analysis of Functional Outcomes (MISTs vs TURP) Qmax
All → ↑ Qmax
HoLEP →statistically significant (p = 0.012)
Others →(p > 0.052)

Qmax

Method	Mean difference	CI	P-value
Bipolar TURP vs TURP	–0.539	(–1.139—0.060)	0.070
Bipolar TUVP vs TURP	–1.696	(–3.416—0.024)	0.052
HoLEP vs TURP	1.687	(–0.711—2.664)	0.012
KTP vs TURP	–1.826	(–19.466—15.814)	0.414



Meta-analysis of Functional Outcomes (MISTs vs TURP)
PVR
All→no statistically significant differences



Descriptive and Meta-analysis of Complications

Intraoperative Complications

Table 21.4: Treatment-specific intraoperate complications

Procedure	*Bleeding*	*Capsular perforation*	*Conversion to TURP*	*Injury of the mucosa*	*Transfusion*	*TUR syndrome*	*Total*
TURP% (range)	0.3 (0-7.7)	0.1 (0-2.7)	0.0	0.0	2.0 (0-9)	0.8 (0-5)	3.2
Bipolar TURP, % (range)	0.0	0.0	0.0	0.0	1.9 (0-3.7)	0.0	1.9
Bipolar TUVP, % (range)	0.0	0.0	0.0	0.0	0.5 (0-2)	0.0	0.5
HoLEP, % (range)	0.0	0.2 (0-2)	0.0	3.3 (0.0-18.2)	0.0	0.0	3.5
KTP, % (range)	0.0	0.0	3.5 (0-8)	0.0	0.0	0.0	3.5

- Highest → TURP (3.2%) and HoLEP (3.5%)
- TURP → more variations
- HoLEP → specific risk of Bladder injury
- MISTs→ No risk of TUR syndrome
- KTP→ conversion to TURP (if considered a complication)

Perioperative Complications

Table 21.5: Treatment-specific perioperative complications

Procedure	*AUR reacatheterization*	*Clot retention*	*Secondary apical resection*	*Secondary coagulation revision*	*Secondary hemorrhage*	*Episodes of hematuria*	*Urosepsis*	*UTL fever*	*Total*
TURP, % (range)	4.5 (0.0–13.3)	4.9 (0–39)	0.1 (0.0–3.3)	1.0 (0.0–1.43)	0.5 (0–8)	3.5 (0–100)	0.1 (0.0–3.3)	4.1 (0–22)	18.7
Bipolar TURP, % (range)	3.6 (0.0–10.4)	4.3 (0–16)	0.0	0.0	0.5 (0–8)	1.0 (0–58)	0.0	2.6 (0.0–11.5)	12.0
Bipolar TUVP, % (range)	8.2 (0–30)	5.3 (0–14)	0.0	0.0	0.5 (0–1)	0.0	0.0	0.0	14.0
HoLEP, % (range)	5.9 (0.0–16.6)	0.0	0.5 (0.0–3.3)	1.4 (0–5)	0.0	0.0	0.0	0.9 (0.0–4.9)	8.8
KTP, % (range)	9.9 (7.7–5.3)	0.0	2.1 (0.0–5.2)	0.0	0.7 (0–3)	0.0	0.0	120 (0–17)	24.7

- TURP→ most frequent: AUR, clot retention, recurrent hematuria, UTI/fever
- Bipolar TURP→ ~ TURP (lesser extent)
- Bipolar TUVP→ high rate of AUR (8.2%), >>> clot retention
- HoLEP→ Lowest cumulative perioperative complication rates (<10%)
- KTP laser → Highest perioperative complication rates (mainly AUR and UTI)

Late Complications

Table 21.6: Treatment-specific late complications

Procedure	*Bladder neck stenosis*	*Urethral stricture*	*Reinter-vention due to BPE*	*Secondary treatment*	*Transient dysuria*	*Urgency*	*Stress UI*	*Total*
TURP, % (range)	2 (0–21)	4.1 (0–21)	0.5 (0–7)	0.1 (0–4.3)	0.8 (0–22)	2.2 (0–38)	0.6 (0–5)	10.5
Bipolar TURP, % (range)	0.5 (0–4)	2.4 (0–8)	0.2 (0–3)	0.2 (0–29)	0	0.2 (0–2)	0	3.5
Bipolar TUVP, % (range)	0.5 (0–1)	1.9 (0–6)	2.4 (0–12)	0	2.9 (0–12)	0	0	7.7
HoLEP, % (range)	1.2 (0–3)	4.4 (2–8)	0	0	1.2 (0–10)	5.6 (0–44)	0.9 (0–3)	13.3
KTP, % (range)	5.0 (0–13)	6.3 (3–10)	5.6 (0–18)	0	8.5 (0–22)	0	0	25.4

- TURP, most important→BNS (2%), urethral strictures (4.1%) and persistent urgency (2.2%)
- Bipolar TURP and HoLEP→ ~ TURP profile
- Lowest cumulative late complication rates→ Bipolar TURP and TUPV
- TUPV→ higher retreatment rates (2.4%), and typical transient dysuria (8.3%)
- Highest cumulative rate complication→KTP

Overall Complications

Treatment-specific distribution of intraoperative, preoperative, late, and overall complications (in percentage).

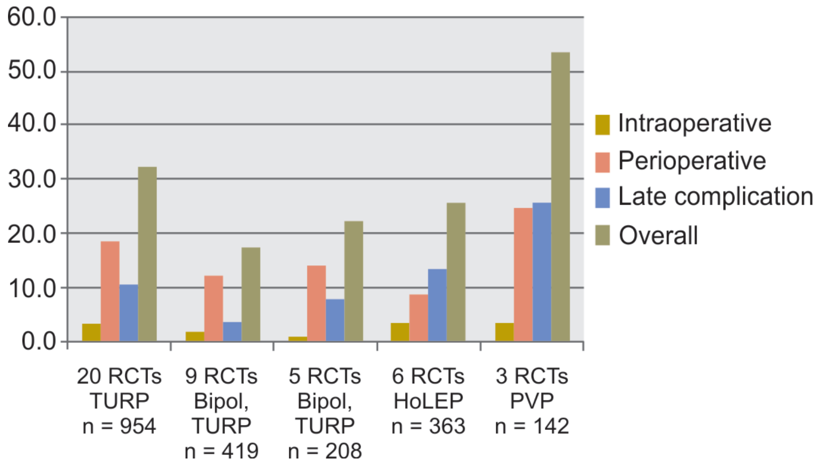


Figure 21.3: Treatment-specific distribution of many complications

Independent of the surgical procedure, intraoperative <<< preoperative/late post-operative.

COMPLICATIONS OF LASER PROSTATECTOMY: A REVIEW OF RECENT DATA

- Intraoperative safety PVP and HoLEP has been proven
- Long-term data confirm the safety and durability of HoLEP

Table 21.7: Compared statement of various common lasers from various published series as applied to surgical management of BPH

	Ho:YAG 50 W	*Ho:YAG 100 W*	*KTP 80 W*	*LiBr 120 W*	*Th:YAG 70 W*	*Diode (Biolitec 120 W)*	*Gallium aluminium arsenide 2–20 W*
Requires cooling system	Yes	Yes	Yes	Yes	Yes	No. Makes the machine light weight and truly portable	No. Makers the machine light weight and truly portable
Technique	Enucleation	Enucleation	Vaporization	Vaporization	Enucleation	Vaporization	Interstitial coagulation
Suitable gland side	Any	Any	Not suitable for very large prostates	Better than KTP, but not suitable for very large prostates	Any	Better than KTP, but not suitable for very large prostates	Small
Anesthesia	Regional	Regional	Local/ Regional	Local/ Regional	Regional	Local/ Regional	Local
Learning curve	High	High	Low	Low	High, but less than Ho:YAG	Low	Low
Catheterization time compared to TURP	Similar or lower	Similar or lower	Low	Low	Similar or lower	Low	More
Blood loss compared to TURP	Similar to lower	Similar to lower	Low	Low	Less than Ho:YAG	Low	Low
Anatomical details	Good	Good	Poor	Poor	Poorer than Ho:YAG	Poor	–
Management of associated stones/ diverticulum	Yes	Yes	No	No	No	No	No
Hospital stay	Same or low	Same or low	Low	Low	Same or low	Low	Low
Stricture rate	Same or low	Same or low	Same or low	Same or low	Same or low	Same or low	Low
Incontinence rate	Same or low	Same or low	Low	Low	Same or low	Low	Low
Regrowth of adenoma compared to TURP	Same	Same	More	More	Same	More	High
Retrograde ejaculation	Same or low	Same or low	Low	Low	Same or low	Low	Low
Impotence	Same or low	Same or low	Same or low	Same or low	Same or low	Same or low	Low

- Long- term database still necessary to evaluate the longevity of PVP
- Diode-laser and thulium-laser prostatectomy—an early stage of clinical evaluation.

KTP/PVP

Functional Outcomes

- Small to midsized → promising results with (so far) comparable to TURP.
- Large → controversial → further stresses the need for evidence-based guidelines on indications specifically with respect to prostate size.

Complications

- Overall statistically significantly not different to TURP ($p = 0.472$).
  - Intraoperative → rare
  - Postoperative → increase
- More RCTs with medium- to long-term follow-up are needed to determine the durability.

Current Lasers for BPH Surgery

There are 3 wavelengths in current use:

1. Holmium : YAG (wavelength = 2140 nm)
2. KTP (The Green light laser = 532 nm)
3. Thulium (wavelength = 2140 nm).

Table 21.8: Applications of the current urological lasers

	Ablation for BPH	*Resection for BPH*	*Enucleation for BPH*	*TCC ablation*	*Stones*
Holmium	Yes	Yes	Yes	Yes	Yes
Green light	Yes	No	No	No	No
Thulium	Yes	Yes	Difficult	Unproven	No

Table 21.9: Economy of Holmium versus KTP

Multiple use delivery fibers. Each fiber can be used for approximately 50 cases	Single use delivery fibers
Cost of each fiber is ₹ 33,000.00	Cost of each fiber is ₹ 50,000.00
Cost of unit is ₹ 75,00,000.00	Cost of unit is ₹ 1,00,00,000.00
Very useful for stone disintegration	Stone disintegration not possible

CONCLUSION

- PVP and HoLEP are very different laser techniques for the treatment of obstructive BPH.
- HoLEP is the most advanced laser technique currently available.
- HoLEP is size independent procedure suitable for any prostate, and highly effective at treating urinary retention.

- More tissues are removed with HoLEP than PVP.
- Thulium: longer follow-up is desirable.

LASER PROSTATECTOMY

- HoLEP and KTP or LBO – laser vaporization of the prostate are the most mature techniques of laser prostatectomy and are presently a genuine challenge to TURP and open prostatectomy.
- Despite favorable hemostatic properties of various diode lasers, a higher invasion depth seems to result in necrosis of the tissue leading to a higher rate of reoperation.
- Thulium laser results seem promising but data are limited.

Disadvantages

- High initial cost
- Recurring cost
- Steep learning curve
- Significant endoscopic skills required
- Duration of surgery more than TURP!!

Economic Issues

- The economic issues are more complex however, Holmium Laser spares the cost of the higher early morbidity of TURP and maybe used for different urologic conditions other than BPH treatment.
- Our data have demonstrated that HoLEP is associated with a significant hospital net cost savings compared with open prostatectomy in patients undergoing surgery for symptomatic BPH for large glands.

Economy

Cost analysis done at AIIMS by Prof Gupta NP et al.

Cost of TURP and its Modifications

Thick loop, bipolar TURP	-	No significant difference
HoLEP	-	2.43 times cost of TURP
KTP-PVP	-	12.5 times cost of TURP

Type of Practice

Primarily stones	-	10–20 Watts
Prostate, stones and others	-	80–100 Watts

Cost of Equipment

(An average 100 cases per month)

Add ₹ 10,000 per case for laser	-	10 Lacs per month
Cost recovery	-	7–8 months
Maintenance cost	-	₹ 1000–2000 per patient

Lasers are here to stay !!

- Future directions

- Suitable laser for a given clinical situation for optimal outcomes
- Economical and sturdy
- Short learning curve
- Better morcellator
- Recognized training centers all over the world.

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22

Transurethral Resection of the Prostate and Sex: Erectile Dysfunction and Retrograde Ejaculation

• Vijay Kulkarni • Ajay Kanbur

ERECTILE DYSFUNCTION AND TURP

Benign Enlargement of the Prostate (BEP) and Erectile Dysfunction (ED)

- Both are common in elderly patients
- Is there any "causal" relationship between BEP and ED?
- Effect of TURP on erectile function is controversial
- Available evidence is conflicting.

How do you rate your confidence that you could get on keep on erection?	Very low	Low	Moderate	High	Very high
When you hod erections with sexual stimulation, how often were your erections hard enough for penetration?	Never or almost never	A few times	Some times	Most times	Almost always or always
During sexual intercourse, how often were you able to maintain your erection after you had penetrated (entered) your partner?	Never or almost never	A few times	Some times	Most times	Almost always or always
During sexual intercourse, how difficult was it to maintain your erection to completion of intecourse?	Extremely difficult	Very difficult	Difficult	Slightly difficult	Not difficult
When you attempted sexual intercourse, how often was it satisfactory for you?	Never or almost never	A few times	Some times	Most times	Almost always or always

Figure 22.1: Erectile dysfunction test

Erection Complex Phenomenon

- Neurological
- Hormonal
- Arterial
- Venous
- Muscular.
- Influenced by factors like:
  - Psychogenic
  - Cognitive
  - Environmental.

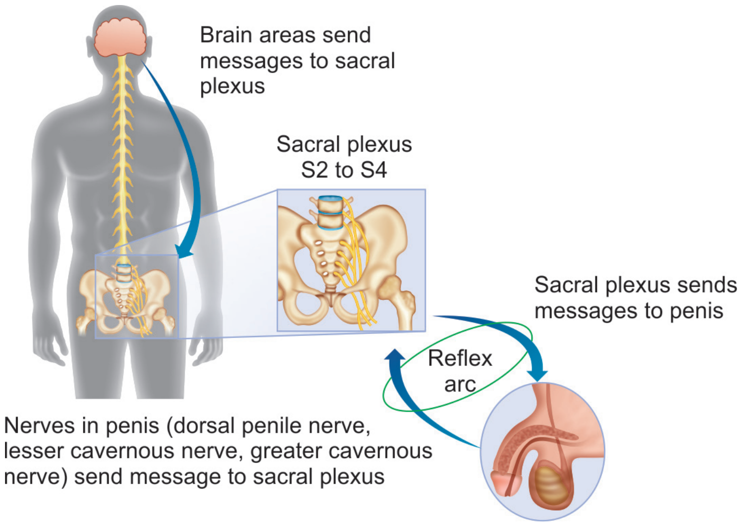

Figure 22.2: Neurological pathways

Pathophysiology of ED Following TURP

- Psychogenic—Surgery on genitalia
- Electrocoagulation—Nerve injury—Corpus cavernosum
- Thrombosis of arteries
- Venous leak
- Incidence: 4–35%
  - Wide variation!!
  - Pre-existing ED—Not factored.

Psychogenic Cause

- Major Impact
- LUTS and severe obstructing voiding symptoms—Patient avoided sex
- Post-TURP—Urethral mucosal injury—Dysuria—Painful erections—avoided sex
- Once symptoms are relieved, patients “infact” improved libido—Resumed sexual activity.

Relative Improvement in ED

- What about improved erectile dysfunction?

Capsular Perforation

- Nerve injury as a cause
- Perforations adjacent to N-V bundle—Correlates with the incidence of ED

Size of Prostatic Adenoma

- Small size of adenoma
- More probability to thermal damage to N-V bundles
- Correlates with the incidence of ED
- Loss of antegrade ejaculation has been postulated as another cause for decline in sexual function.

Comparisons – TURP/TUMT/TUNA/Laser

- Compared all four groups
- TURP – 26.5% E.D
- TUMT/TUNA/laser – 18-20% E.D

Only One Prospective Study

- "TURP and SEX : Patient and partner prospective 12 years follow-up study".

Conclusions

- ED associated with LUTS precedes TURP
- TURP did not adversely affect sexual function
- Long-term sexual function is maintained after TURP

Treatment

- PDE5 Inhibitors – Sildenafil, Tadalafil, Vardenafil, Udenafil
- ICIVAD – Papaverine, Bimix, PGE1, Triple mix
- Vacuum erection device.

SEX AND TURP – RETROGRADE EJACULATION

Definition

Failure of bladder neck contraction resulting in backward propulsion of sperms into bladder during ejaculatin.

Common Causes of Retrograde Ejaculation (RE)

- Diabetes—autonomic neuropathy
- Surgery on bladder neck/prostate
- Drugs—alpha blockers for treatment of hypertension or BPH
- Stress.

Physiology

- A receptors present in urinary tract, α1 A seen in prostate smooth muscle, Seminal vesicles, trigone and vas
- α-1D seen in bladder and spinal cord
- During ejaculation, the sympathetic activity causes bladder neck to shut and vas to contract; semen flows into posterior urethra (emission) and then via BC muscle into penis (expulion).

Mechanism of RE

- Normal process – Closure of bladder neck during emission and expulsion
- In RE, bladder neck remains open and semen takes the path of least resistance – enters bladder.
- Orgasmic pleasure remains unaffected.
- Semen is then washed out as 'cloudy urine' while voiding after ejaculation.

Incidence of RE

- Following TURP—90%
- Following BNI/TUIP—10% to 50%
- 3 of 4 patients will still be sexually active post-TURP
- Sexual function after transurethral resection of the prostate (TURP): results of an independent prospective multicenter assessment of outcome.

Diagnosis

- History—Dry ejaculate with normal sense of orgasm, cloudy post ejaculate urine
- Presence of sperms (≥ 10–15/HPF) in midstream urine collected after intercourse.

Treatment Options

- Drugs that increase sympathetic tone of bladder smooth muscle
- Ephedrine 25–30 mg qds

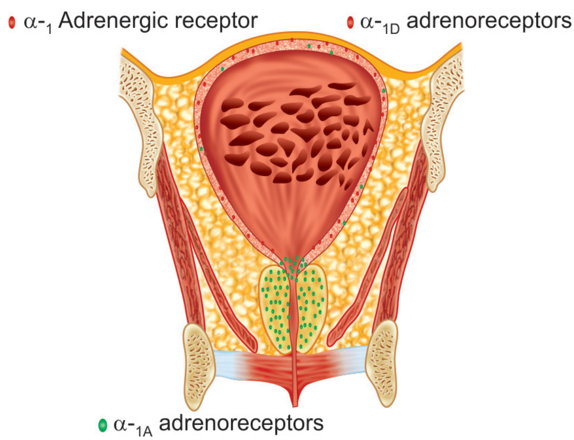

Figure 22.3: Distribution of alpha receptors

- Pseudoephedrine 60 mg qds
- Imipramine 25 mg bd
- Midodrine 10 mg tds is significantly better than rest

Fertility Issues

- Medical and Surgical
- Medical —Start drugs about 7 days prior to partner's ovulation
- Procedure—sperm retrieval – oral sodium bicarbonate to optimize urine pH and osmolality or instill IVF meduim into bladder via catheter and ask patient to give post masturbation urine for sperm collection.
- Electroejaculation.
- Best option is sperm retrieval.

Sperm Retrieval

- Seven days before expected ovulation/ICSI/IUI – Tablet Sodamint 3 tds for 7 days or any urinary alkalizer in qds dose with water.
- Instill at least 10–15 ccs of intracytoplasmic sperm injection (ICSI) media (e.g. Ham's F-10) in bladder with catheter and ask patient to masturbate. Collect post-ejaculate urine sample in a sterile container and spin it to retrieve sperms for ICSI.

Legal Implications

- Transurethral incision of the prostate (TUIP) + TURP – All patients must have an informed consent regarding possibility of RE
- Semen storage/sperm banking in select cases
- Erections not affected due to surgery on bladder neck.

Conclusion

- ED associated with LUTS precedes TURP
- TURP did not adversely affect sexual function
- Long-term sexual function is maintained after TURP.

Treatment

- PDE5 Inhibitors – sildenafil, tadalafil, vardenafil, udenafil
- ICIVAD – papaverine, bimix, PGE1, triple mix
- Vacuum erection devices.

Take Home Message

- RE seen in 90% of patients post-TURP
- Opened up bladder neck is the cause
- Inform patient well in advance through a written consent
- Treatment with sympathomimetics not always fruitful
- Most have to learn to live with it
- Sperm retrieval if infertility an issue.

What is the Evidence to Support ED as a Predictor of Coronary Artery Disease (CAD)?

- A significant proportion of men with ED exhibit early signs of CAD.
- Men with pre-existing ED may develop more severe CAD than those without ED.
- The interval between the onset of ED symptoms and the occurrence of CAD symptoms is estimated at 2–3 years and a cardiovascular event at 3–5 years.
- There is a common endothelial pathology underlying both ED and CAD.
- Erectile dysfunction is associated with increased all-cause mortality primarily through its association with CAD mortality.

PDE5 INHIBITORS AND LUTS

Phosphodiesterase Inhibitors

- First clinical report in 2002 of improvement in LUTS in men given sildenafil (Viagra) for their ED level 1 evidence from (currently) four clinical trials clearly showing improvement of LUTS results.

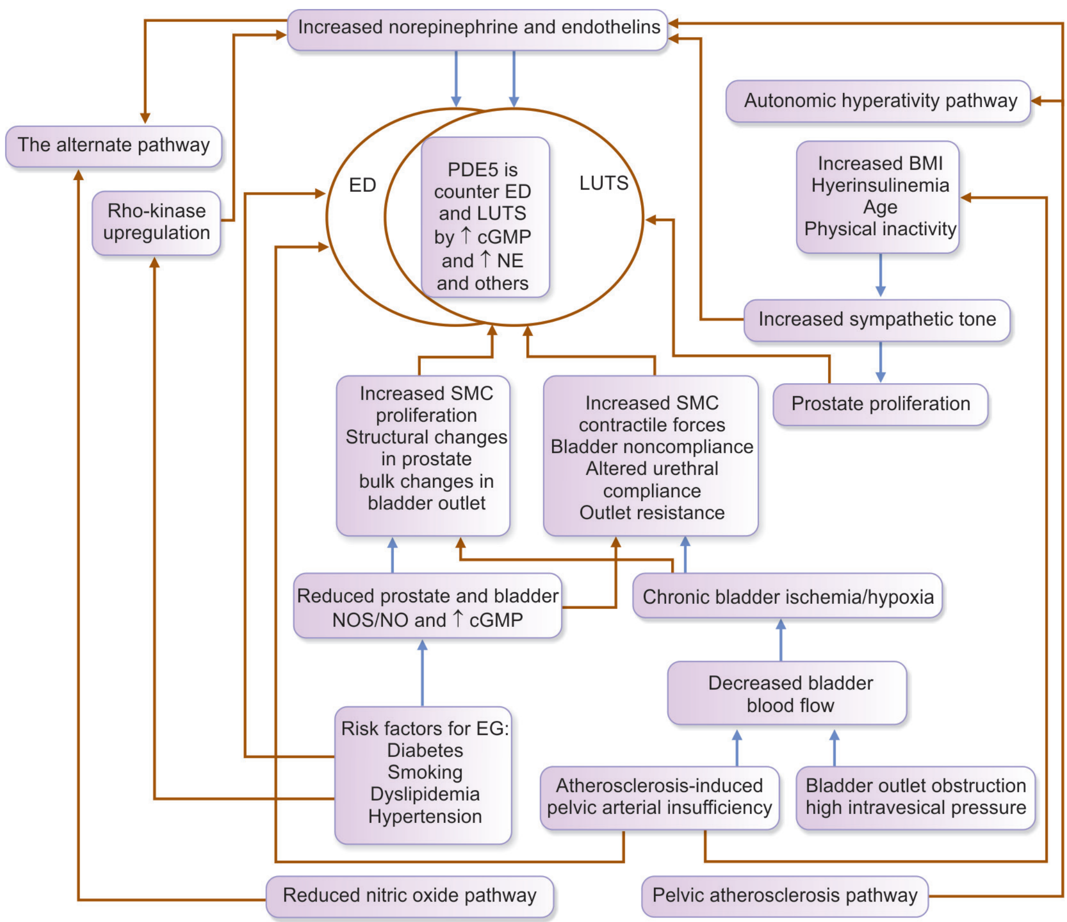

Figure 22.4: Pathophysiology of PDE5 inhibitors and LUTS

- IPSS improved by 6.32 points compared with 1.93.
- The BPH Impact Index improved by 2 points compared with 0.9.
- Quality of life score improved by 0.97 compared with 0.29 for Placebo. More severe LUTS improved more.
- No significant difference in PFR, to suggest any other mechanisms were involved than simply smooth muscle relaxation in the bladder and prostate.

Phosphodiesterase Inhiitors

Mechanism

- Pelvic atherosclerosis
- Autonomic hyperactivity
- The calcium-independent Rho-kinase activation pathway
- Reduced nitric oxide (NO) levels, the best explored process
- Overlap mechanisms, and ultimate effect leading to smooth muscle relaxation in prostatic bladder neck, or erectile tissues
- Clinical trials showing improvement of LUTS after treatment with PDEIs: Summary of level 1 evidence from four RCTs investigating PDEIs (Sildenafil, Vardenafil, Tadalafil).

Table 22.1: Clinical trails showing improvement of LUTS after PGEIS

Study	*Agent, dose and duration*	*No. treated*	*Inclusion*	*Placebo run in*	*IPSS score∆: PDEI vs placebo*
Mc Vary 2007	Sildenafil 50–100 mg/day for 12 weeks	369/189	Age > 45, H/O ED, ≤ 25 IIEF, IPSS ≥ 12	No	6.3 vs 1.9 ($p < 0.0001$)
Stief 2008	Vardenafil 10 mg BD for 8 wks	222/109	Age 45 – 64, IPSS ≥ 12, No H/O ED required	No	5.9 vs 3.6 ($P = 0.0013$)
McVary 2007b	Tadalafil 5 mg . 20 mg per day, 4 wk run in + 12 weeks (6.6)	281/138	Age ≥ 45, IPSS ≥12 from BPH for 6 months. No H/O ED required	Yes	5 mg 2.8 vs 1.2 ($P = 0.003$) 20 mg 3.8 vs 1.7 ($p < 0.001$) 7.1 vs 4.5 ($p < 0.001$) includes run in
Roehrborn 2008	Tadalafil 2.5,5,10,20 mg/ day 4 weeks run in + 12 weeks	1058 ~ 212/ group	Age ≥ 45, IPSS ≥12 from BPH for 6 months. PFR 4 – 15 mL/ sec	Yes	2.5 mg 3.9 vs 2.3 ($p<0.05$) 5 mg 4.9 vs 1.8 ($p < 0.05$) 10 mg 5.2 vs 4.5 ($p < 0.05$) 20 mg 5.3 vs 4.5 ($p < 0.05$)

Combination Therapy

α-Adrenergic Blockers and Phosphodiesterase Inhibitors

- 12-week open-label single-center pilot study randomized 62 men between 25 mg of sildenafil (21 men), 10 mg of alfuzosin (20 men), and a combination of both agents (21 men).
- Improvement in PFR and IPSS more marked in combination therapy had greater improvement.
- Symptomatic hypotension in some patients because both are vasodilators.

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23

Erectile Dysfunction as Marker of Coronary Artery Disease

• Shailesh A Shah

ERECTILE DYSFUNCTION – TODAY'S CONCEPT

Penis is the barometer of Endothelial Health....

....Erectile Dysfunction is a mirror of Metabolic Syndrome.

PENIS IS THE BAROMETER OF CARDIOVASCULAR HEALTH

- The small size and excessive content of endothelium and smooth muscle make penis very vulnerable to oxidative stress and the variations of systemic nitric oxide levels as well as in the other vascular organs.

Why ED before CAD? Difference in Size of Artery

- Difference in size of artery
- Larger artery may not demonstrate reduction of flow until plaque reaches to greater size.

What is the Evidence to Support ED as a Marker of CAD?

- Approximately 2/3 of men with ED exhibit early signs of CAD.
- Men with pre-existing ED may develop more severe CAD than those without ED.
- The interval between the onset of ED symptoms and the occurrence of CAD symptoms is estimated at 2–3 years and a cardiovascular event at 3–5 years.

ED AS A MARKER OF CAD

- There is a common endothelial pathology underlying both ED and CAD
- Erectile dysfunction is associated with increased all-cause mortality primarily through its association with CAD mortality
- ED→ seldom report overt CAD
- CAD→ often pre-existing ED → severe CAD
- Many severe CAD → may not have ED.

IF YOUR BPH PATIENT HAS ED WHAT WILL YOU DO?

Investigate BPH with ED

- Blood tests:
  - Abnormal fasting lipids
  - Abnormal sugar
  - Abnormal BMI
  - Unusual CRP
  - Abnormal homocysteine.

CAN CARDIOVASCULAR EVENTS BE PREVENTED BY INTERVENTION FOLLOWING ONSET OF ED?

- Yes ! It can by prevented by modification of lifestyle, weight loss
- Medical treatment of blood pressure, diabetes, dyslipidemia
- Cessation of smoking
- But – no! It can not be reversed.

TAKE HOME MESSAGE

- ED may be marker (Warning Sign) for occult CAD.
- ED is associated with increased all cause mortality primarily due to increased cardiovascular mortality.
- Urologist has opportunity to investigate aging BPH patients, in this group recognizing link between ED and CAD may improve lives and also save lives.

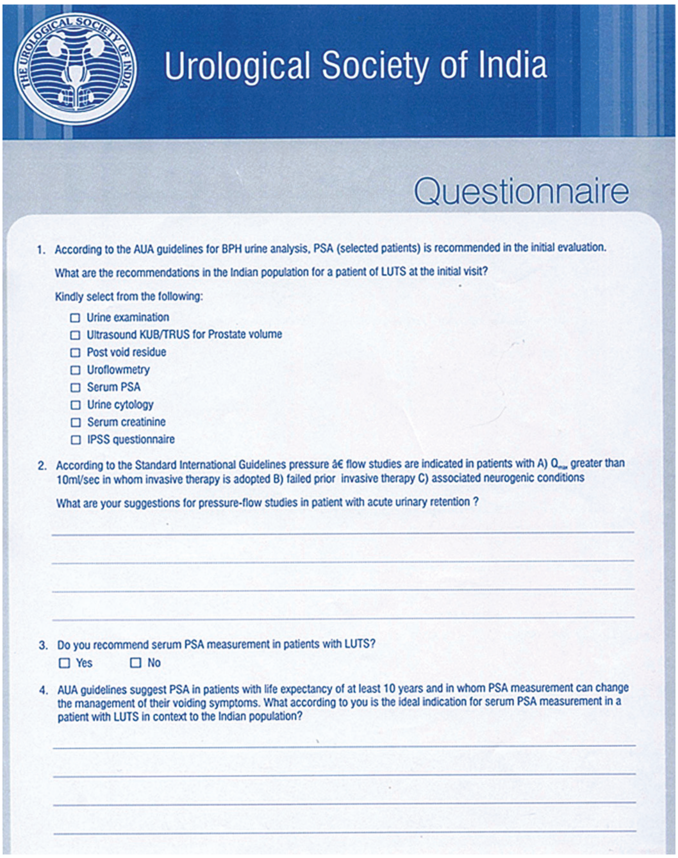
24

Consensus of Guidelines on Management of Benign Prostatic Hyperplasia

• Shailesh A Shah

METHODOLOGY

- A MEDLINE search of all publications related to BPH till December 2006 (total 78).
- All publications done by the Indian authors (13 out of 78).



Urological Society of India

Questionnaire

1. According to the AUA guidelines for BPH urine analysis, PSA (selected patients) is recommended in the initial evaluation.
   What are the recommendations in the Indian population for a patient of LUTS at the initial visit?
   Kindly select from the following:
   - ☐ Urine examination
   - ☐ Ultrasound KUB/TRUS for Prostate volume
   - ☐ Post void residue
   - ☐ Uroflowmetry
   - ☐ Serum PSA
   - ☐ Urine cytology
   - ☐ Serum creatinine
   - ☐ IPSS questionnaire
2. According to the Standard International Guidelines pressure â€ flow studies are indicated in patients with A) Q_{max} greater than 10ml/sec in whom invasive therapy is adopted B) failed prior invasive therapy C) associated neurogenic conditions
   What are your suggestions for pressure-flow studies in patient with acute urinary retention ?
3. Do you recommend serum PSA measurement in patients with LUTS?
   ☐ Yes ☐ No
4. AUA guidelines suggest PSA in patients with life expectancy of at least 10 years and in whom PSA measurement can change the management of their voiding symptoms. What according to you is the ideal indication for serum PSA measurement in a patient with LUTS in context to the Indian population?

Total 619 USI members responded

- International Guidelines on BPH:
  – American Urological Association (AUA)
  – European Association of Urology (EAU)
  – Canadian and WHO
  – Singapore
- Personal questionnaire to Indian urologists
- Peer reviewers: 6

PROSTATE AWARENESS PROGRAM, ONLY 10 MEMBERS RESPONDED

- We were overwhelmed by response of 619 member's written response.
- Industry support was required to distribute questionnaire and to bring reply.
- List of all USI member participant is officially published in guideline.

Diagnostic Guidelines

Mandatory

- History
- Physical examination
- Urine analysis
- IPSS score (To be taken by a medical assistant and confirmed by the consultant urologist).

USI MEMBER'S RESPONSE

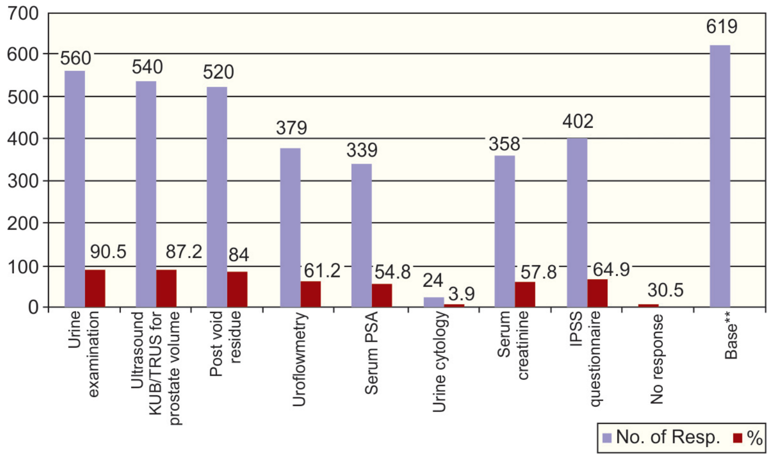


Figure 24.1: Recommendations in the Indian population for a patient of LUTS in initial visit

Diagnostic Guidelines

Recommended

- Serum creatinine
- Transabdominal sonography

- Uroflowmetry or visual examination of voiding pattern
- Serum prostate-specific antigen
- In AUA guideline, routine measurement of serum creatinine level is not suggested.

USI Member's Response

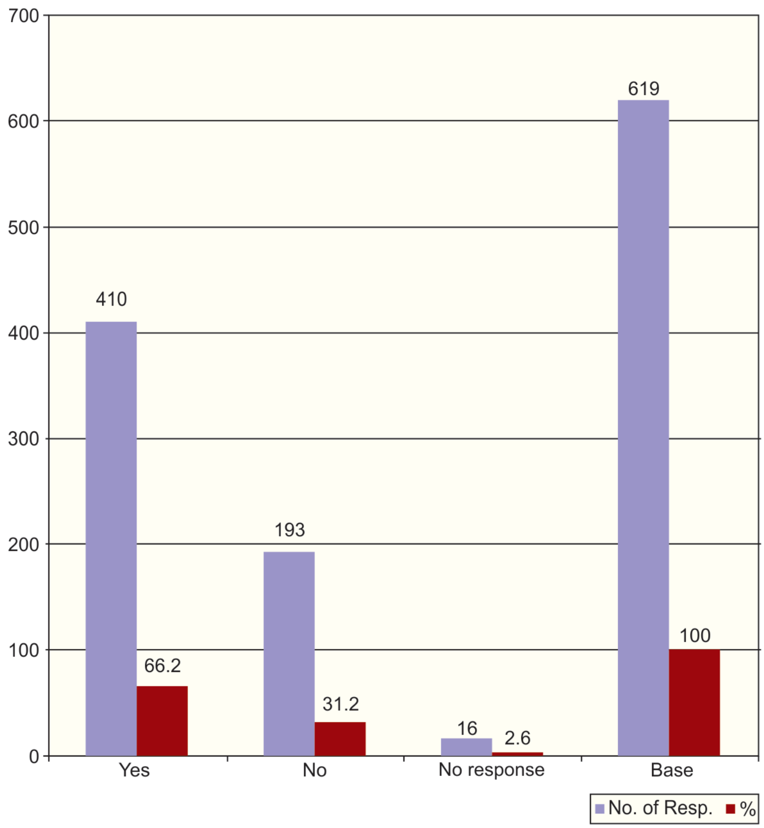


Figure 24.2: Recommendations for PSA in the initial visit

Treatment Guidelines

- Medical Therapy
  - Standard:
  - α-blockers
  - 5 α-reductase inhibitors
  - Combination therapy
- Not Recommended
  - Phytotherapeutic agents (can be used as a placebo)
  - Ayurvedic drugs are left on patient's choice.

USI Member's Response

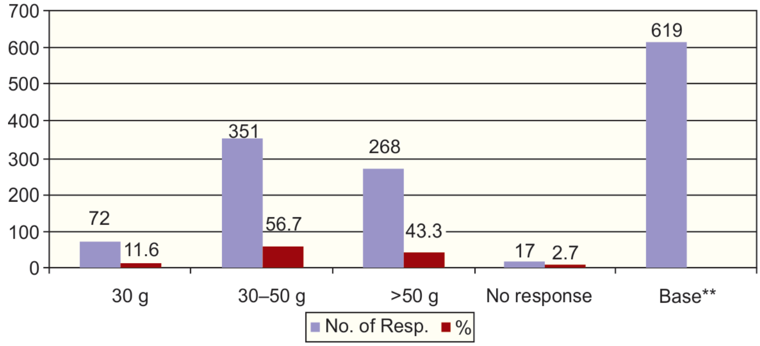


Figure 24.3: Prostate size to recommend combination therapy of α-blocker and 5 α-reductase inhibitor

Treatment Guidelines

- Indications for surgery:
  - Refractory urinary retention
  - Recurrent urinary tract infection
  - Recurrent hematuria refractory to medical treatment
  - Renal insufficiency
  - Urinary bladder stones
  - Median lobe projection in bladder (Grade III : >10 mm).

USI Member's Response

Treatment Guidelines

Surgical Treatment Options

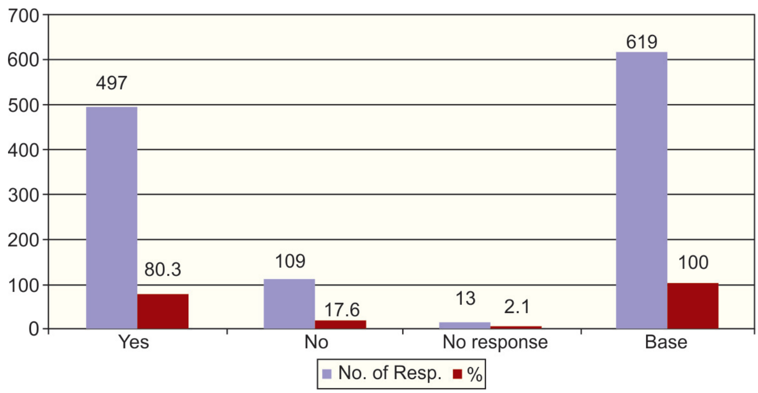


Figure 24.4: Median lobe enlargement as indicator of surgery

- Standard:
  - Transurethral resection of the prostate
  - Transurethral incision of the prostate
  - Open prostatectomy.
- Recommendations:
  - Laser prostatectomy
  - Transurethral vaporization resection of the prostate
- Options:
  - Transurethral microwave therapy
  - Transurethral needle ablation of the prostate
  - Stents.

USI Member's Response

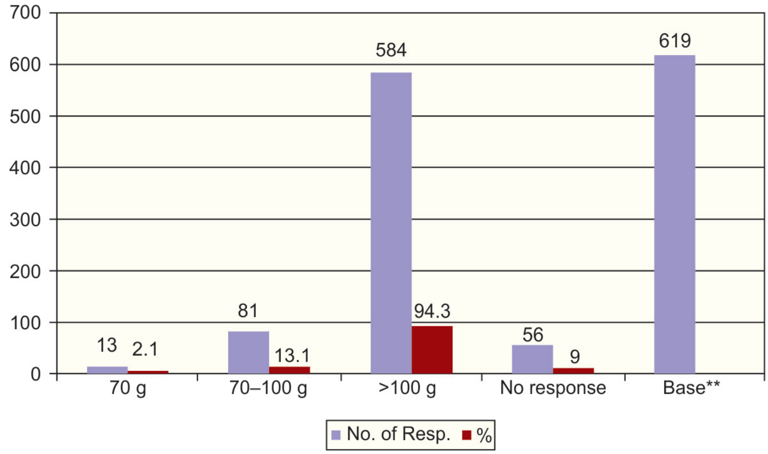


Figure 24.5: Prostate size as a recommendation for open surgery

Special Considerations

- Acute urinary retention
- Chronic urinary retention with BPH
- BPH related bleeding
- BPH with associated chronic prostatitis symptoms
- BPH patients with prostate cancer concern
- BPH with bladder stone
- BPH treated by general surgeon or hospital owners in periphery of tertiary centers and managed by visiting (mobile) urologists.

25

Anticoagulated Patient and Failed Trial without Catheter after Acute Urinary Retention

• Vishwamber Nath

ANTICOAGULATED PATIENT

- Cerebral venous sinus thrombosis (CVST) anticoagulated
- Failed Trial without Catheter (TWOC)/medical management.

What are the options?

- Postpone surgery till off anticoagulant.
- Operate while anticoagulated
  - Open prostatectomy
  - TURP
  - Laser/bipolar
- Long-term catheter.

CVST—Management and Clinical Course

- Anticoagulate
- Treat underlying cause if identified/possible
- 5.6% mortality; 88% total recovery
- Duration of anticoagulation depends on underlying cause
  - 6-12 months if unknown cause/mild thrombophilia
  - Indefinitely for severe thrombophilia.

What is the Evidence?

- Not possible to conduct RCT to test impact of anticoagulants on TURP.
- Zero transfusion in 43 patients treated with PVP for mean prostate size 75 mL/s.

What would I do and Why?

- Postpone till off anticoagulant/long-term catheter (depending on likely course of CVST ± other comorbidities)
- Laser vaporization/TUVis if available
- TURP with low molecular weight heparin (LMWH) bridging therapy
  - After detailed counseling and high-risk consent.

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26

Antiplatelets and Transurethral Resection of the Prostate

• Deepak Kirpekar

TRANSURETHRAL MANAGEMENT OF BPH

Statistics

- 30% : No antiplatelets
- 10% : Aspirin without prescription
- 40% : Combination with doctor's advice
- 20% : Combination indicated and cannot stop.

What is Commonly Used?

- Aspirin antiplatelet agents
- Clopidogrel
- Low molecular weight heparin
- Heparin
- Warfarin.

How do They Act?

Aspirin

- Cyclo-oxygenase pathway
- Inhibits production of Thromboxane A2 acting on COX 1 enzyme preventing platelet aggregation
- Quick on action—2 hours
- Irreversible—7 to 9 days.

Clopidogrel

- Adenosine diphosphate pathway
- Platelet ADP receptor P2Y antagonist
- Action time—3 to 7 days
- Irreversible action
- Platelet precursor—Megakaryocyte.

Why the Delimma?

- Cardiologists use them for primary/secondary prevention.
- With incresing number of percutaneous coronary intervention (PCI), more need to keep patients on antiplatelet for longer duration.
- Greatest cardiovascular risk following withdrawal—Rebound.

Surgery or Trauma may itself Increase the Risk of Thrombogenic Event

- Increased production of endogenous catecholamines
- Increased platelets adhesiveness
- Decreased fibrinolysis.

Risks Involved in Stopping Antiplatelets

- If given an option, cardiologists will not stop it.
- Platelets play a very crucial and central role in development of ACS (Acute Coronary Syndrome).
- Clopidogrel in unstable angina/recurrent event CURE trail, sample size 12500, clearly mentions not stopping Clopidogrel in patients with PCI.
- Non-cardiac surgery within 6 weeks of PCI, cardiac event rate is 5 times higher.

PERCUTANEOUS CORONARY INTERVENTION

Stents

Basic Metal Stent (BMS)

- High incidence of restenosis due to neointimal hyperplasia
- Complete cover 6 months.

Drug-Eluting Stents (DES)

- Sirolimus/paclitaxel.
- No hyperplasia
- Complete cover 40 months
- More risky without cover.

Table 26.1: Recommended duration of dual antiplatelet therapy after PCI

Aspirin (75–325 mg/day)	Life-long without interruption
Clopidogrel (75 mg/day)	
Baloon angioplasty without stenting	2–4 weeks
Myocardial infarction	3–6 weeks
ACS (unstable)	12 Months
PCI and stents (BMS or DES)	12 Months

American Heart Association (AHA)/American College of Cardiology (ACC)

- Change over to LMWH/Heparin is a option used because of control and reversibility.
- No evidence to support heparin bridging to prevent intraoperative thrombosis.
- Antithrombins have no antiplatelets activity.
- Cessation of heparin actually causes platelets activation increasing the risk.

High-risk Patients

- Recent or recurrent ACS
- Recent PCI < 6 weeks
- Left ventricular ejection traction (LVEF) < 30 %
- Three-vessel disease
- Stent length > 25 mm DES.

Demographic Factors

- Advanced age
- Females
- Obesity
- Diabetes
- Hypertension
- Renal impairment
- High risk for bleeding
- High risk for ischemic event
- Very few studies in urology as compared to other branches.
- Metal-analysis of 475 studies comparing with/without aspirin show bleeding complications increase by 1.5 folds
- Clopidogrel has far more effect by stopping.

Can this be Quantified?

- Routine coagulogram does not detect this.
- Number does not get affected, quality does.
- Thromboelastogram (TEG)
- Cannot change the course.

Recent survey in the UK showed, most urologist stopped clopidogrel prior to surgery

TURP	96.6%
Major urosurgery	91.7%
TRUS biopsy	90.6%
Extracorporeal shock wave lithotripsy (ESWL)	81.8%
Cyst	70%

Guidelines for Urology

Urological surgery – 3% risk postoperative MI/ACS

Table 26.2: Our recommendation on cessation of clopidogrel prior to a urological procedures stratified by risk of bleeding

	Risk of bleeding during procedure		
	Low	*Moderate*	*High*
Non-urgent procedure	Continue clopidogrel ± aspirin	Delay procedure until clopidogrel can be stopped at recommended time*	Delay procedure until clopidogrel can be stopped at recommended time*
Urgent procedure/ suspicion/treatment of malignancy	Continue clopidogrel ± aspirin	Stop clopidogrel** continue aspirin	Stop clopidogrel** ± aspirin
Based on available evidence and the British Cardioascular Intervention Society guidelines			
Low bleeding risk procedures includes cystoscopy, ureteroscopy ± stone extraction, lasertripsy stone, ureteric stent insertion, laser prostatectomy			
Moderate risk procedures include inguinoscrotal surgery, bladder or ureteric biopsy, cystohydrodistention, bladder neck incision, TRUS biopsy, SPC insertion, etc.			
High-risk procedures include TURP, TURBT, major renal, bladder or prostate surgery (Open/laparascopic), PCNL, ESWL, etc			
*The British Cardiovascular Intervention Society guidelines			
** After consultation with cardiologist and informed consent from patient			

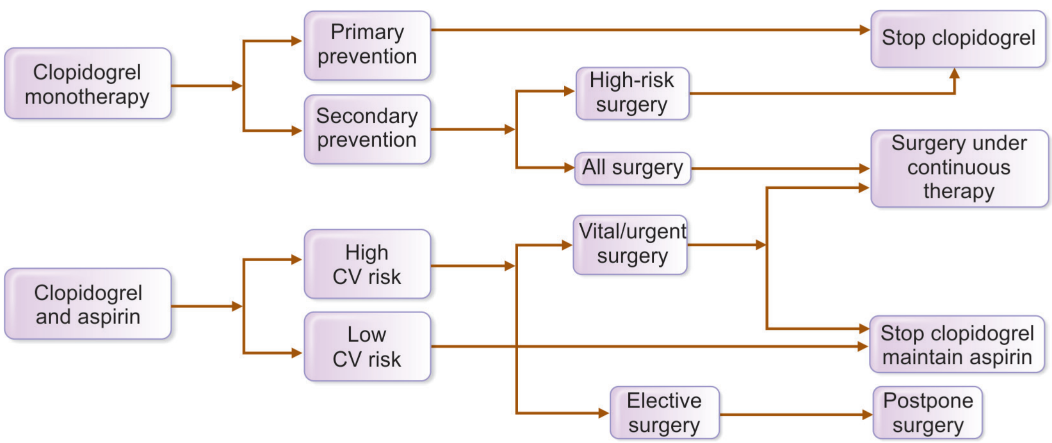

Figure 26.1: Uses of clopidogrel

Low risk—cyst, URS ± stone extraction, laser lithotripsy, stenting, laser prostatectomy.

Medium risk—Inguinoscoral surgery, bladder/ureteric biopsy, BNI, TRUS biopsy, TVT.

High risk—TURP, TURBT, Major renal, bladder, prostate surgery (LAP/OPEN), PCNL, ESWL.

If Antiplatelets are not to be discontinued, what next?

- When you have no choice, you still have options
- Wait 6 weeks post-PCI
- Start medical management
- Offer laser prostatectomy.

Lasers in Prostate Surgery

- Bloodless/minimum coagulation
  - KTP
  - Thulium
  - Diode
  - Holmium.

TURP on Patient with Antiplatelets

- Water at low pressure
- Progressive resection
- Spot coagulation
- Reverse flow hemostasis
- Traction/irrigation.

Postoperative Care

- Intraoperative bleed can always be controlled. If you are within the frame of time/space.
- Postoperative slow oze/sec. bleed troublesome.
- Hydration.
- Antibiotics.
- No exersion, no straining.
- Good control of diabetes/hypertension.

Newer Drugs

- Antiglycoprotein IIb/IIIa agent→ Eptifibatide, Tirofibin
- An→ 6 hours prior
- Reversible antiplatelets agent→ AZD 6140, cangrelor.

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27

Transurethral Resection of the Prostate and Pacemaker

• PVLN Murthy

PACEMAKER

Battery-operated implantable pacing device was first introduced in the year 1958, just 4 years after the invention of transistor. Since then these devices have grown in their complexity, calculation and data storage abilities and the natural progression of pacemaker development led to the invention of the implanted cardioverter-defibrillator (ICD) around 1980. It is reported that about 600,000 pacemakers are implanted each year worldwide and the total number of people with various types of implanted pacemaker has already crossed 3 million.

Currently around 8000 pacemakers are being implanted annually in India, and 26,000 in the United Kingdom. There has been a major shift in the treatment paradigm of cardiac arrhythmias because of improved survival with pacing the ICD than with the antiarrhythmic drugs. Consequently more and more patients with complex pacing systems are likely to present for non-cardiac surgery. Therefore, the safe perioperative management of these patients requires an understanding of the various modes of pacing, their indications and

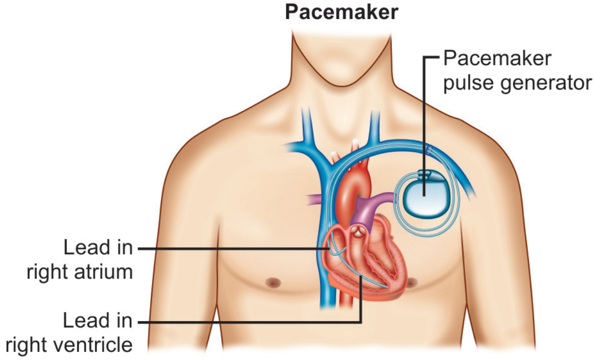

Figure 27.1: Pacemaker pulse generator

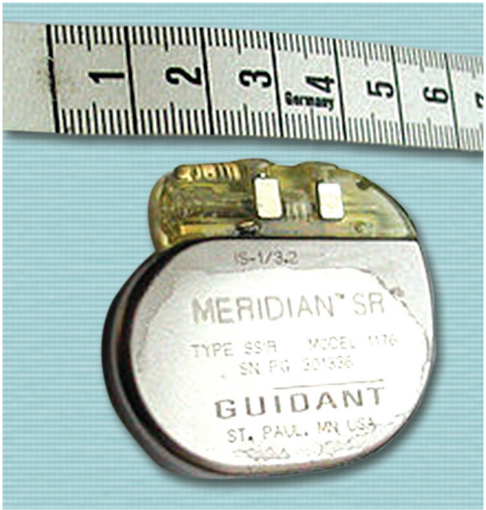

Figure 27.2: Pacemaker

contraindications and the treatment strategy in the event of perioperative pacemaker failure.

Artificial pacemaker is a small, battery-opened device indicated for the treatment of symptomatic bradycardia of any origin.

Implantabble cardioverter defibrillator (ICD) monitors the patient's heart rhythm continuously and treats the VF and VT either delivering the counter stocks or combination of counter shock and antitachycardiac pacing stimuli to the heart.

Pacemaker (PM) Indications

- Symptomatic sinus node disease
- Symptomatic atrioventricular node disease
- Long QT syndrome
- Hypertrophic obstructive cardiomyopathy
- Dilated cardiomyopathy.

ICD Indications

- Ventricular tachycardia
- Ventricular fibrillation
- Brugada syndrome (right bundle branch block, ST elevation V1 to V3)
- Arrhythmogenic right ventricular dysplasia
- Long QT syndrome
- Hypertrophic cardiomyopathy
- Prophylactically in post-MI with EF, 30%.

Understanding of the generic pacemaker code, (a new five letter code system to describe the operation of implantable pulse generators and defibrillators), which has been published by the North American Society for pacing and electrophysiology—The Heart Rhythm Society (HRS-NASPE) and the British pacing and the electrophysiology group (BPEG) published initially in 1983 and revized in 2002.

The five position NBG pacemaker code is laid out in a simple, easy to follow, five position format.

The fifth position is used fully by implantable cardioverter defibrillators and their ability to pace or shock patients out of tachyarrhythmias. Most current generation ICDs will be represented by a D (dual-shocks and paces) in the fifth position.

The NBG Code

Table 27.1: NASPE/BPEG generic code

I	*II*	*III*	*IV*	*V*
Chamber(s) paced	*Chamber(s) sensed*	*Mode(s) of response*	*Programable functions*	*Antitachycardia functions*
V = ventricle	A = atrium	T = triggered	R = rate modulated	0 = none
A = atrium	V = ventricle	I = inhibitted	C = communicating	P = paced
D = dual (A and V)	D = dual (A and V)	D = dual (T and I)	M = multi programable	S = shocks
0 = none	0 = none	0 = none	P = simple programable	D = dual (P and S)
			0 = none	

PACEMAKER MAGNETS

The effect of placing a magnet over a pacemaker or ICD is quite variable depending upon the device manufacturer, model and the individual programed mode. This information can be obtained by consulting the manufacturer's representative. Most pacemakers switch to a fixed rate pacing mode when a magnet is placed. However, the response of a pacemaker to a magnet placement may include the following:

- Asynchronous pacing without rate responsiveness
- No response
- Brief (10 to 100 beats) asynchronous pacing
- Continuous or transient loss of pacing.

In the past, magnets have been used during surgery to convert devices to an asynchronous mode, counteracting the effects of electromagnetic interference (EMI) by eliminating the sensing component of the device. However, magnet application readies many pacemakers for reprograming. Intraoperative EMI such as defibrillation and electrocautery can mimic programing signals and cause the device to be erroneously reprogramed. In addition, certain pacemakers revert to an asynchronous mode only for a certain number of beats and then return to the previous pacing mode. In certain patients, especially with ICDs, asynchronous pacing can lead to VT and even VF as a result of an R-on-T phenomenon. Therefore, asynchronous pacing should be avoided in patients prone to VT and VF.

The response of an ICD to a magnet placement is different from the response of a pacemaker. Magnets will disable tachyarrhythmia detection and therapy, which except in some Guidant-Boston Scientific devices are re-enabled when the magnet is removed. Magnets in general will not affect the pacing mode or the rate of the ICD. But Guidant-Boston Scientific devices are permanently disabled when a magnet is placed for more than

30 seconds. If a magnet is to be used during surgery, the magnet effects should be tested in the operating room before surgery to ensure the desired effects will occur during surgery.

Response of Pacemakers to Electrocautery include

- Inhibition of pacing
- Asynchronous pacing
- Reset to backup mode
- Myocardial burns (rare)
- Ventricular fibrillation.

Response of ICD to Electrocautery

- Inhibition of pacing
- Asynchronous pacing
- Inappropriate tachytherapy
- Inhibition of tachytherapy.

How to Prevent the Effects of Electrocautery Interference on the Pacemaker?

- Position the grounding pad such that direction of current flow (PM) is at right angles to the PM lead. Place it close to the operative site.
- Do not use cautery within 15 cm of PM as it interferes with battery circuitry. If in contact with a break, it may cauterize the myocardium at the electrode tip making it insensitive to pacing impulse.
- Use dry foil plates to the self-adhesive disposable variety, (because they offer better current conduction).
- The cautery current should be applied for no more than 1 second at a time, allowing at least 10 seconds for the device to function properly. This will permIt the pacemaker enough time to maintain cardiac output.
- Because the use of electrocautery also interferes with the ability of the ECG to monitor the heart, heart rate and blood pressure should be monitored using an arterial line. When the electrocautery is not in use, the ECG should be checked for arrhythmias or alterations in pacemaker function.
- Bipolar and laser energy are prefareable as they do not interfere.

Other Factors that Interfere with PM Function

- Succinylcholine-induced fasciculations
- Postoperative shivering
- Hypokalemia/hyperkalemia
- Myocardial infarction and scarring
- Local anesthetic toxicity
- Care should be taken during insertion CVP or PA catheter guide wire as they are potentially arrhythmogenic. In a patient with recently implanted PM or ICD, it can easily get dislodged.

Avoid Insertion or Choose Alternative Site

The following steps should be taken if defibrillation is unavoidable. If possible, use the anterior-posterier type of paddles, pacing the anterior paddle as far away from the pulse generator as possible. This should allow the current to flow away from the pulse generator as possible. This should allow the current to flow away from the generator.

If the anterior type of paddles must be used, place them along a line perpendicular to the lead(s). This may be difficult if the patient has a dual-lead system.

Use the lowest defibrillator current setting possible. Inability to defibrillate at low current settings will necessitate an increase, and damage to the pulse generator may become unavoidable. For these reasons, a temporary pacing system must be available.

If at any time during the procedure, it becomes apparent that the device has lost its ability to stimulate the heart, due to damage to the pulse generator or the lead-tissue interface, temporary pacing measures must be taken. Inotropic support should also be available and used if necessary. The appropriate cardiology or cardiothoracic surgery department should be informed, and a decision should be made about the repair or replacement of the device.

PREOPERATIVE EVALUATION

Before any planned surgery, the patient with a pacemaker or ICD should be thoroughly evaluated. The patient's cardiologist or cardiothoracic surgeon should be notified and consulted. In addition, the pacemaker or ICD programing device should be obtained, so that device function can be evaluated and appropriately modified during the perioperative period. Someone familiar with the operation of the device should perform any programing and should be available if the device malfunctions. The phone number of the manufacturer of the device should be readily available so the technical support can be obtained during times of uncertainty. It is important that the patient be checked for any progression of symptoms of the underlying cardiovascular disease, as well as for any sort of electrical instability. Factors that may predispose to electrical instability, such as electrolyte imbalance, active myocardial ischemia, or hypoxemia, should be actively sought. If identified, they should be stabilized before surgery. If these factors are allowed to persist, they may facilitate the induction of VF on exposure to electrocautery.

It is also a good idea to obtain a chest X-ray to ascertain the position and integrity of the lead(s). The chest X-ray can also be helpful in identifying the make and model of the pacemaker or ICD. Each device has a serial number and a unique silhouette that can be used for device identification. A complete workup of the functional status of the pacemaker or ICD and the patient's dependence on it should be performed. The type of system, the time since implantation, and the settings at the time of the most recent evaluation should be determined.

In patients with ICDs, it is important to obtain information on the recent frequency of countershocks, because this will be a key factor in determining how safe it is to turn and device.

The NBD code (North American Society of Pacing and Electrophysiology/British Pacing and Electrophysiology Group Defibrillator code) has four letters:

Table 27.2: NASPE/BPEG defibrillator (NBD)

Shock chamber	*Antitachycardial pacing chamber*	*Tachycardia detection*	*Antitachycardial pacing chamber*
0 = none	0 = none	E = electrogram	0 = none
A = atrium	A = atrium	H = hemodynamic	A = atrium
V = ventricle	V = ventricle		V = ventricle
D = dual (A + V)	D = dual (A + V)		D = dual (A+V)

Intraoperative Monitoring

- Procedures like transurethral resection of prostate pose great challenges to the malfunction of the pacemaker because of the use of the electrocautery, potential for fluid and electrolyte imbalance.
- Continuous ECG and peripheral pulse monitoring. The ECG monitor should be set in diagnostic mode instead of monitoring mode.
- CVP, intra-arterial line or PAP monitoring may be used if the patient has poor ventricular function.
- All emergency drugs, DC defibrillator and transcutaneous pacing for cardiac resuscitation must be available.

Failure of Pacemaker Intraoperatively

- Increase inspired oxygen to 100%
- All connections and generator battery should be checked
- Generator should be set into asynchronous mode and the ventricular output should be set on maximum
- Pharmacological management (atropine, adrenaline, isoprinaline) may resolve or CPR should be instituted
- Reprogram by placing an external magnet
- Postoperative care and evaluation
- Extend the intraoperative monitoring
- The appropriate cardiology or cardiothoracic surgery department should be informed that electrocautery or defibrillation was used during surgery. An evaluation of pacemaker that ICD function similar to that performed before surgery should be done in the early postoperative period and then again 24 to 48 hours later. This is necessary because failure of the device to capture, due to damage at the lead tissue interface, may not be apparent until 24 to 48 hours after surgery
- Backup pacing capability and defibrillator should be available
- For ICD patients, all antiarrhythmic therapies should be available
- It is preferable to manage these patients at centers well equipped to deal such problems.

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28

Evaluating Prostate Volume

• Nanjappa MK

Why?

- BPH—Medical/minimal invasive—TUNA.
- Response to 5 alpha reductase inhibitors.
- Planning the modality of intervention prior to surgery.
- Determining PSA density.
- High-intensity focused ultrasound (HIFU)/brachytherapy/cryotherapy.
- Response to hormonal and radiotherapy.

How?

- DRE.
- Cystoscopy.
- Specimen weight.
- Ultrasonography
  - Abdominal
  - Transrectal
  - Transperineal.
- CT scan/MRI.

Digital Rectal Examination (DRE)

- Less accurate.
- Underestimates in huge glands.
- Overestimates in small glands.
- Used for consistency and symmetry rather than volume.

Table 28.1: DRE Grade

Grade	*Encroaches into rectal lumen*
Normal	0–1 cm
I	1–2 cm
II	2–3 cm
III	3–4 cm
IV	> 4 cm

Source: Endoscopy by Roger W Barnes,1959

Cystoscopy

Table 28.2: Cystoscopic grade (Bulge of the lateral lobes)

Grade	*Bulge of the lateral lobes*
Normal	Concave
I	Bulge but do not touch
II	Touch in midline
III	Touch for 2–3 cm
IV	Touch for > 3 cm

Source: Endoscopy by Roger W Barnes,1959

Table 28.3: Cystoscopic grade (Prostatic urethral length)

Grade	*Prostatic urethral Length*
Normal	1–2 cm
I	2–3 cm
II	3–4 cm
III	4–5 cm
IV	> 5 cm

Source: Endoscopy by Roger W Barnes,1959

Table 28.4: Cystoscopic grade (Intravesical)

Grade	*Intravesical*
Normal	Does not cover trigone
I	Covers up to 1/2 of trigone
II	Covers from 1/2 to all of trigone
III	Covers more than trigone
IV	Extends up to fundus

Source: Endoscopy by Roger W Barnes,1959

Specimen Weight

Table 28.5: Specimen weight

Grade	*Amount of tissue to be removed*
Normal	Up to 10 gms
I	Up to 20 gms
II	20–50 gms
III	50–125 gms
IV	> 125 gms

Source: Endoscopy by Roger W Barnes,1959

TRANSABDOMINAL ULTRASONOGRAPHY (TAUS)

- Most common used modality and when TRUS not possible.
- Transitional zone cannot be measured.
- Measurement of PV increases with BV.
- Bladder capacity of 100–200 cc—Near correct PV.
- Near correct PV = PV on USG + division factor for that particular BV.

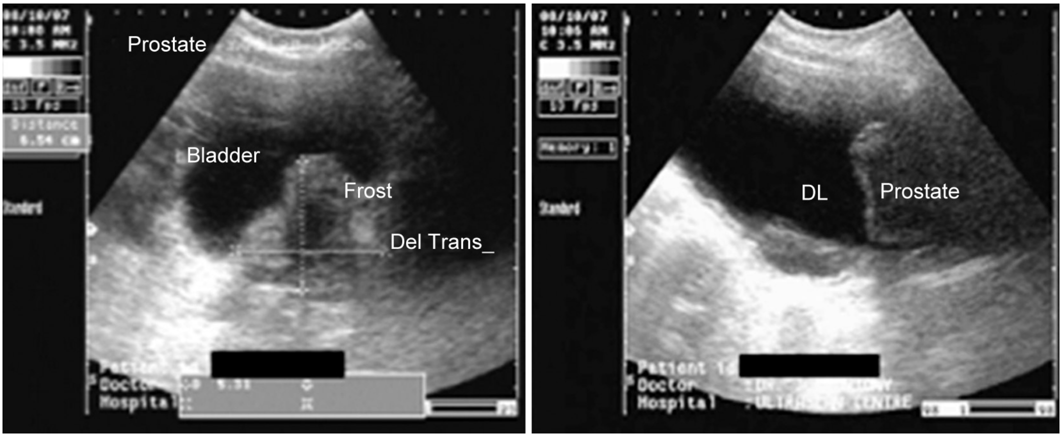

Figure 28.1: Transabdominal ultrasonography for prostate size

TRANSPERINEAL ULTRASONOGRAPHY (TPUS)

- Less invasive and more portable.
- When rectal examination not possible.
- Large scale measurements in clinical research.
- Serial measurements in healthy men.
- High failure rate.

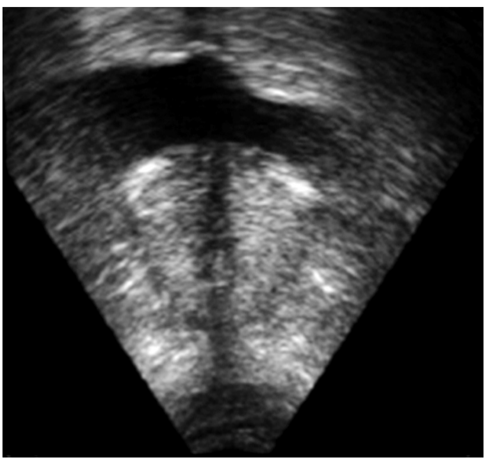

Figure 28.2: Transperineal ultrasonography for prostate volume

TRANSRECTAL ULTRASONOGRAPHY (TRUS)

- Optimal modality to measure PV.
- Noninvasive and cheap.
- Accuracy—Ellipsoid/planimetry.
- Transitional zone (TZ) volume can be measured.
- TZ—accuracy for MX decisions, PSA density, severity of BPH.

FORMULA

Ellipsoid Formula

- Specific gravity of prostate is 1.05 cm^3.
- Weight = Volume.
- L × B × W × π/6 (0.52).

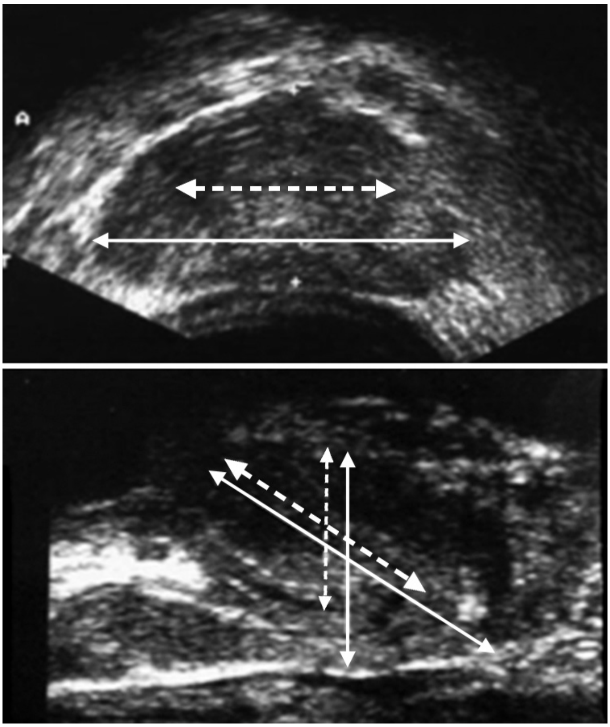

Figure 28.3: Transrectal ultrasonography for prostate volume

Limitations

- Shape is variable.
- Three dimensions are measured in frozen images.
- Three frozen images to measure.

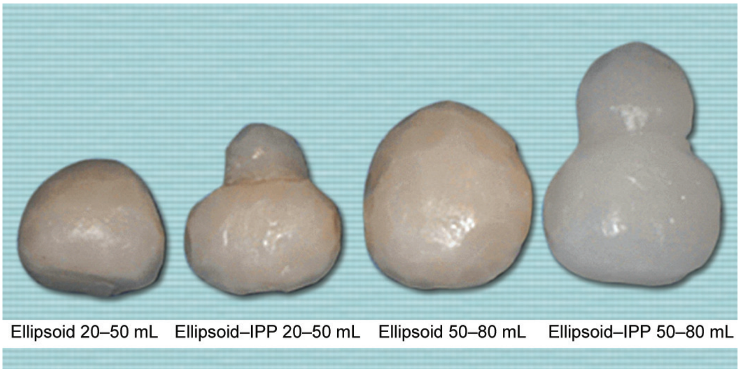

Figure 28.4: Volume of ellipsoids

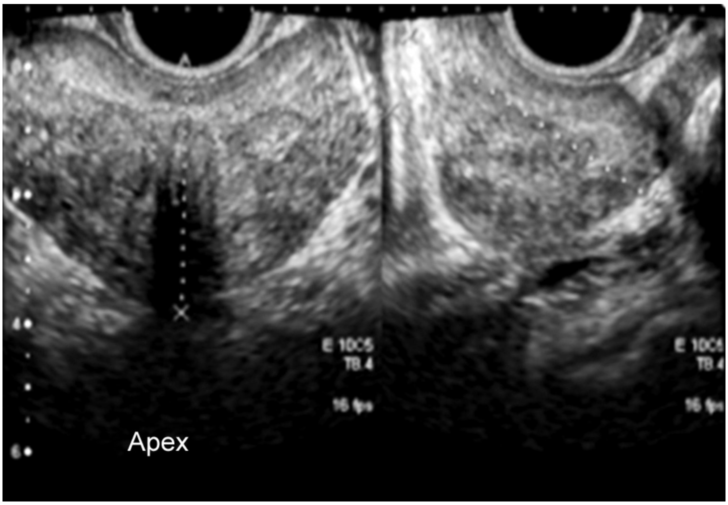

Figure 28.5: Prostate as ellipsoid

- Smaller glands less than 55 cm^2—modified formula L × B × W × π/4.8
- Planimetry and automated volume estimation.

Planimetry

- Most accurate to measure PV.
- Allows for variation in shape.
- US probe is mounted on a stepping device.
- Each image area is measured and summed as PV.
- Time consuming and costly.

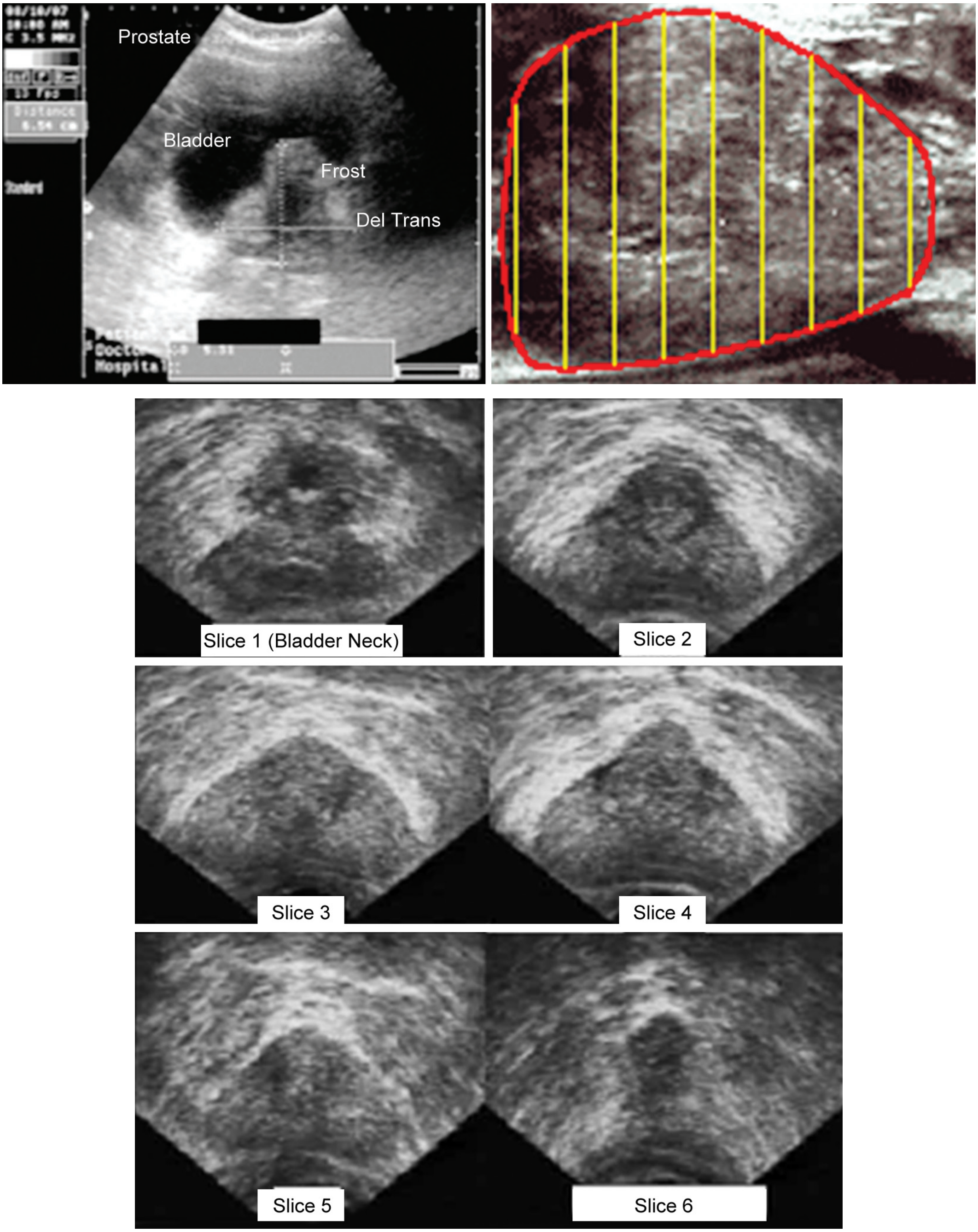

Figure 28.6: Prostate volume by transrectal USG

Automated volume

- Overcomes individual subjectivity.
- Edge detection technology.
- “PCAR” — Presumed circle area ratio.
- PSA density.
- Less time and less inconvenience to patients.

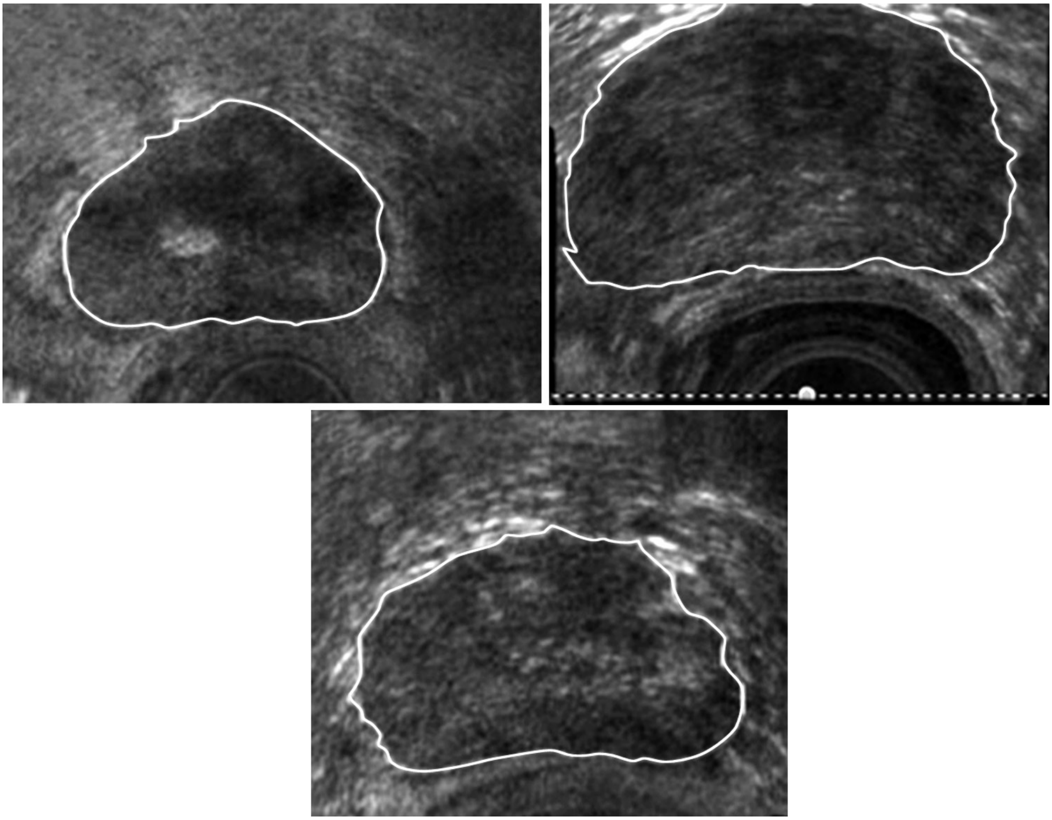

Figure 28.7: Automated prostate volume

Three-dimensional Ultrasonography

- Measures volume in irregular structures.
- Less variable and highly reliable.
- “VOCAL” — Virtual organ computer-aided analysis.
- PSA density/Follow-up in prostate cancer.
- 20% difference in 3D US and PV TRUS.
- Time consuming/costly equipment.

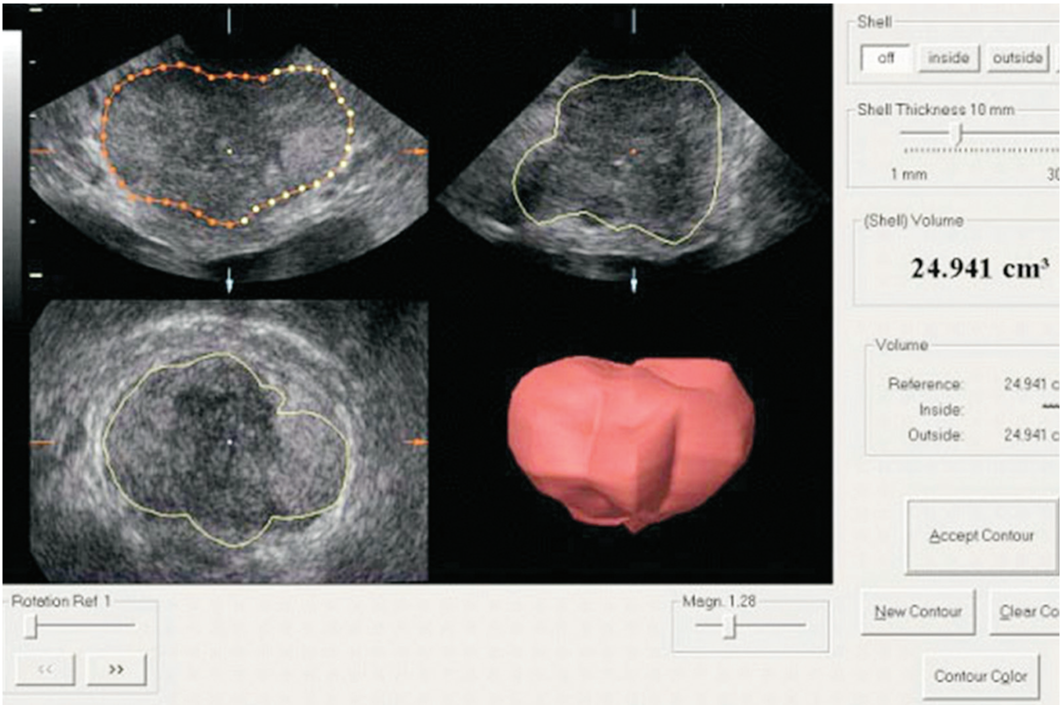

Figure 28.8: Three-dimensional ultrasound

Transitional Zone

- Important parameter than total PV.
- Transitional zone index = TZV/PV.
- > 0.5—lower flow rates, higher symptoms.
- < 0.5—alpha blockers, > 0.5—5 alpha reductase inhibitors.
- More accurate for PSA density.
- Accurate for resected weight and open surgical specimen in BPH.

CT Scan

- Eternal beam radiotherapy/interstitial implantation.
- Overestimates size by 30–50%.
- Poor visualization of the apex.
- Care should be taken to prevent normal tissue from radiation.

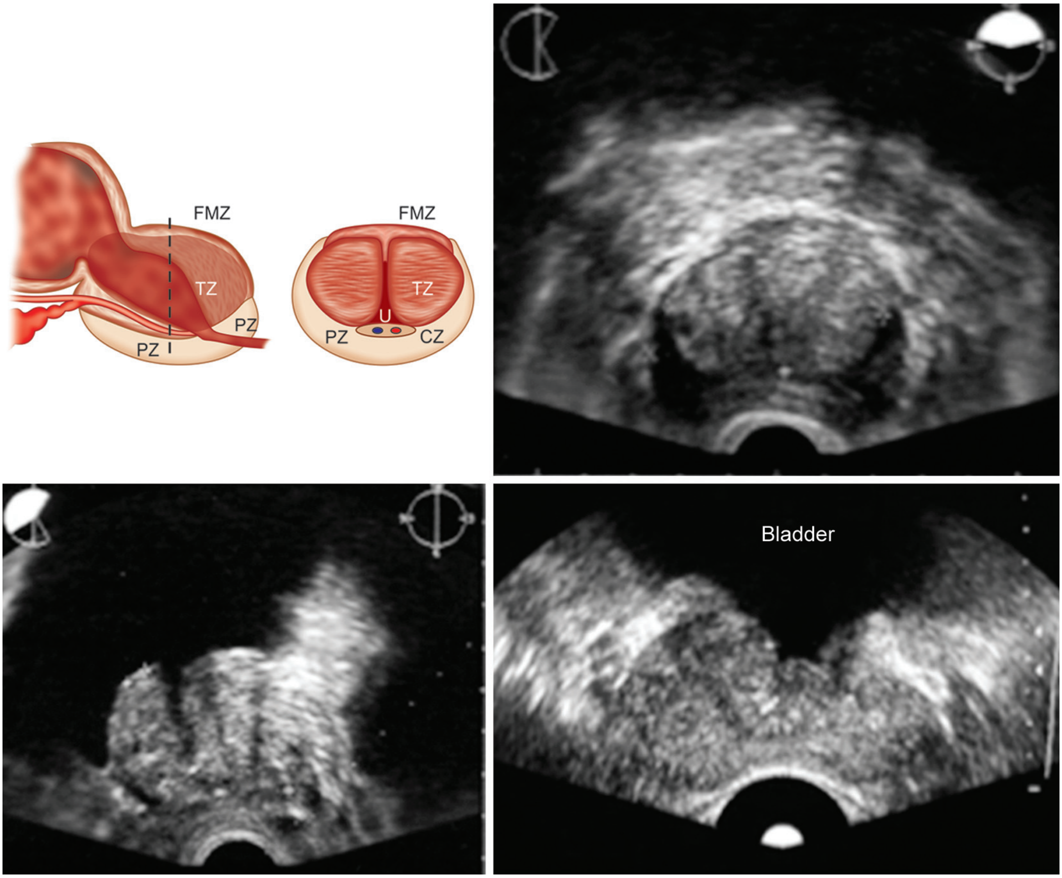

Figure 28.9: Transitional zone

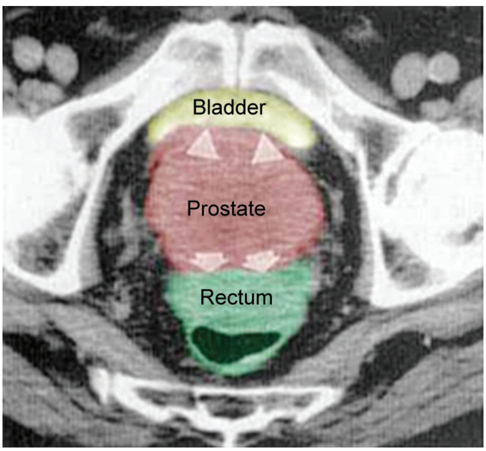

Figure 28.10A

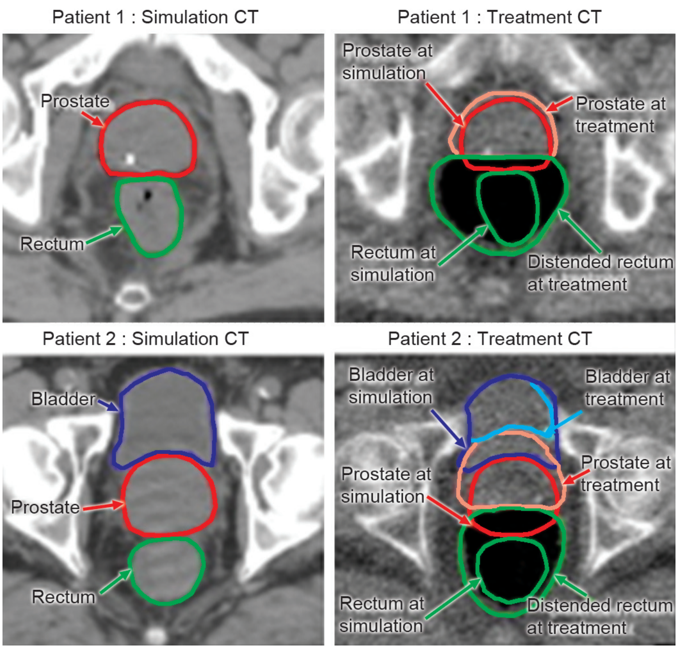

Figure 28.10B

Figures 28.10A and B: Computed tomography for prostate volume

Magnetic Resonance Imaging

- Valuable tool for imaging.
- Endorectal coil.

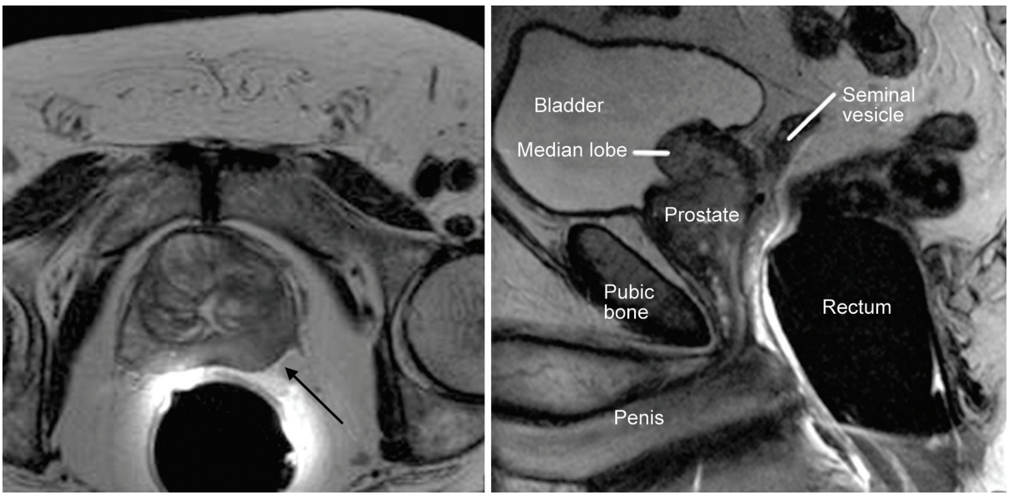

Figure 28.11: Magnetic resonance imaging

- Highly accurate.
- MRI based segmentation and planimetry is the gold standard for PV.
- Monitor therapy.

Prostate Volume

- Helps in decision for management.
- Abdominal US the most common tool, TRUS is optimal as can measure TZ.
- Ellipsoid formula is used.
- Accurate measurements require planimetry.
- MRI—PV is the gold standard.

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29

Bleeding in Transurethral Resection of the Prostate

• Aneesh Shrivastava

INTRODUCTION

- TURP—Gold standard surgical treatment for BPH
- Although minimally invasive, bleeding is a common intraoperative and postoperative issue
- Be aware of best to prevent and treat TURP-related hemorrhage
- Historically, transfusion rates during TURP – as high as 20%
- Improvement in mortality and morbidity in transurethral resection of the prostate over 17 years in a single center
- Factors influencing morbidity in patients undergoing transurethral resection of the prostate
- Blood transfusion—rare in modern TURP era.

REASON

Improvements in:
- Armamentarium including resectoscopes and optics
- Training
- Anesthesia
- Energy sources
- A recent multi-institutional study reported transfusion rates of up to 2.9% after TURP
- Morbidity, mortality and early outcome of transurethral resection of the prostate: a prospective multicenter evaluation of 10,654 patients.
- Others quote—below 2%
- Impact of oral anticoagulation on morbidity of transurethral resection of the prostate

- Meta-analysis of functional outcomes and complications following transurethral procedures for lower urinary tract symptoms resulting from benign prostatic enlargement.

Complications of Transurethral Resection of the Prostate (TURP)—Incidence, Management, and Prevention

- Based on a Medline search from 1989 to 2005, the 2003 results of quality management of Baden-Württemberg, and long-term personal experience at three German centers, the incidence of complications after TURP were analyzed for three subsequent periods, with recommendations for management and prevention early (1979–1994) intermediate (1994–1999); and recent (2000–2005).

Conclusion

Reduced transfusion rates.

Reason

- Technological improvements such as microprocessor-controlled units
- Better armamentarium such as video TUR, and training.

PROSTATE ANATOMY

Vascular Anatomy

Accurately described by Rubin Flocks in 1937.

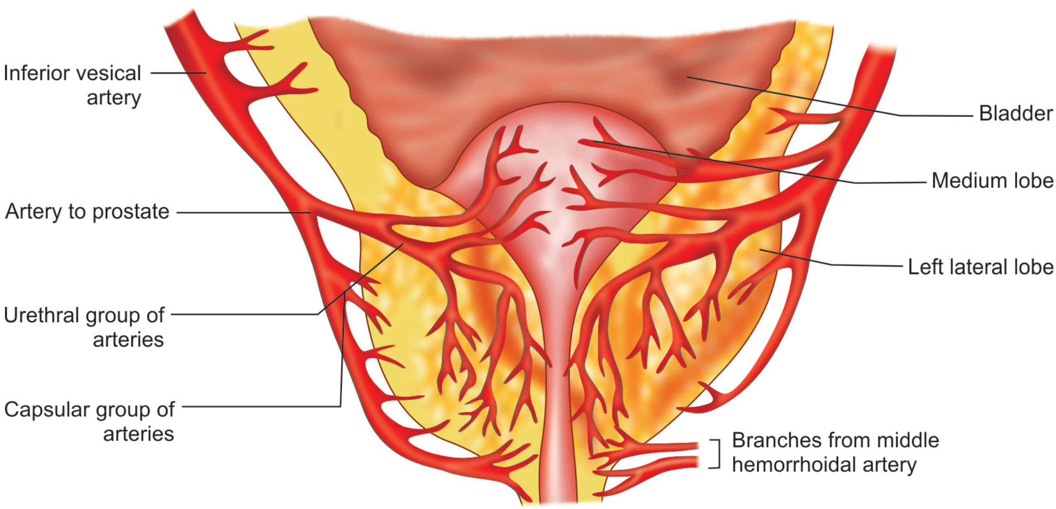

Figure 29.1: Vascular anatomy of prostate

Venous Anatomy of Prostate

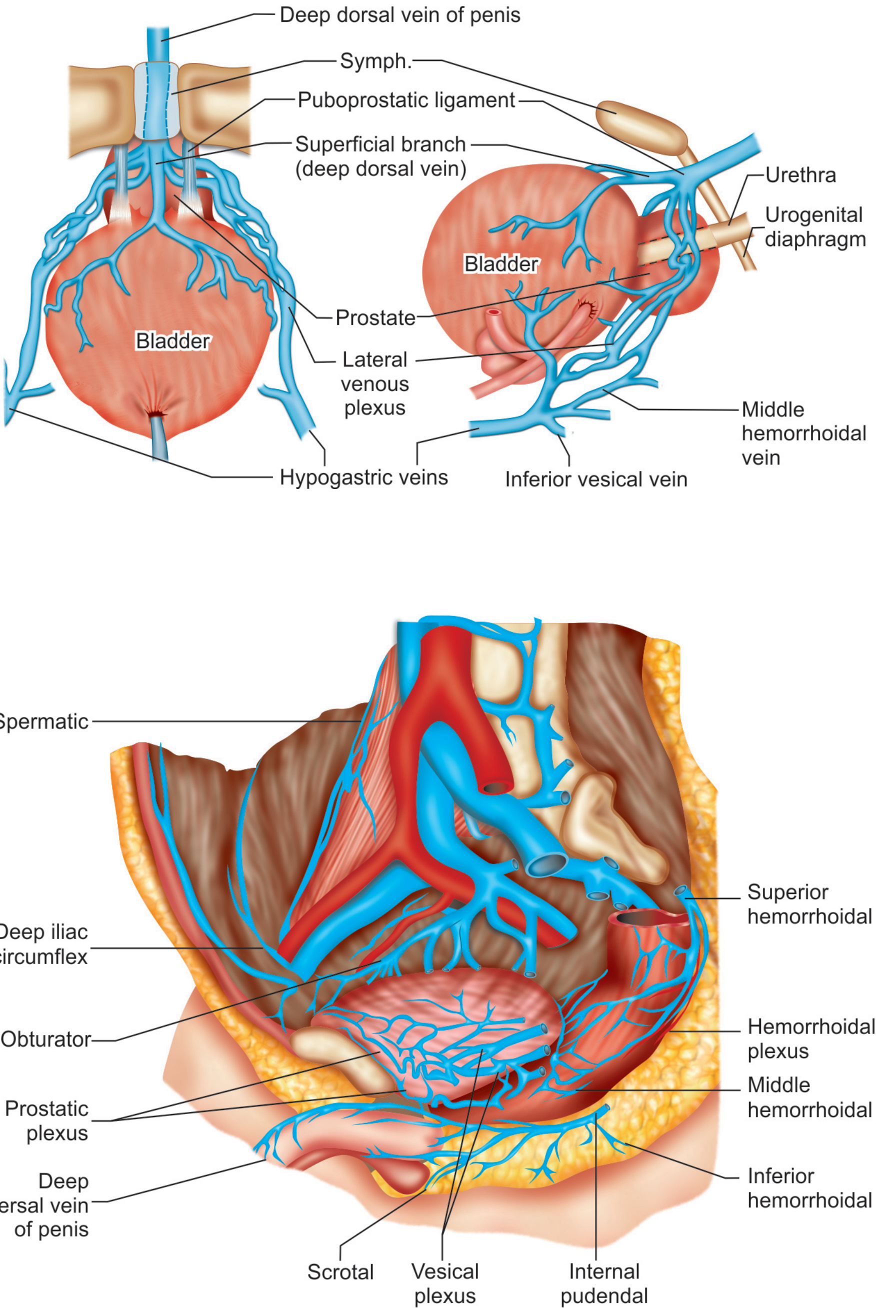

Figure 29.2: Venous anatomy of prostate

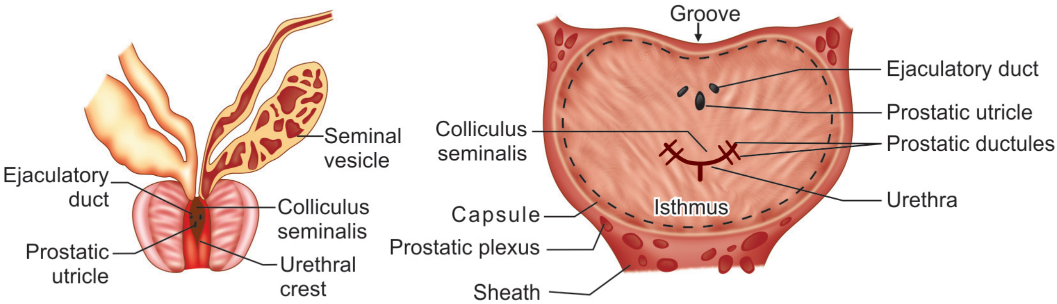

Figure 29.3: Anatomy

Factors Affecting Blood Loss

- Prostate size
- Time of resection
- Arterial bleed
- Deep resection, opening venous sinuses
- Patients on anticoagulant/antiplatelet drugs
- Anesthesia
- Surgical expertise.

Prostate Size and Resection Time

Patients with large prostates, concurrent UTI, or indwelling catheters—at greatest risk

Transurethral prostatectomy—immediate and postoperative complications. Cooperative study of 13 participating institutions evaluating 3,885 patients 1989.

Morbidity, mortality and early outcome of transurethral resection of the prostate: a prospective multicenter evaluation of 10,654 patients.

- Glands larger than 45 g
- Resection time > 90 minutes
  (associated with higher incidence of bleeding)
- Transurethral prostatectomy: immediate and postoperative complications. A cooperative study of 13 participating institutions evaluating 3,885 patients.

Weight of Resected Prostatic Tissue—Most Important Measurable Factor

Factors influencing blood loss in transurethral resection of the prostate (TURP): auditing TURP.

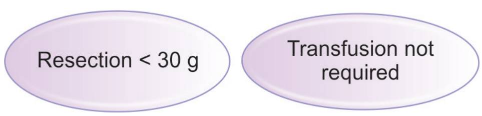

Figure 29.4: Weight of resected prostatic tissue is the most important measurable factor for blood loss in TURP

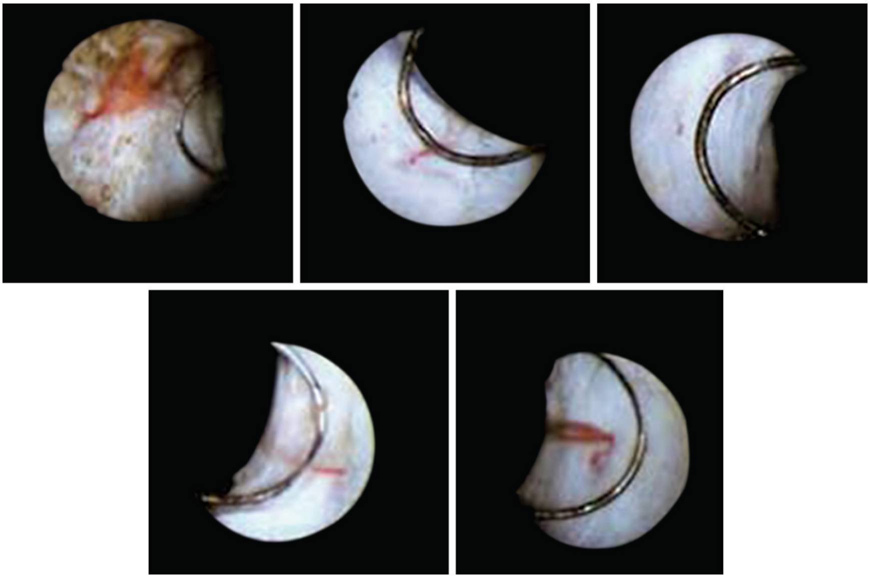

Figure 29.5: Arterial bleeding

ARTERIAL BLEEDING

- Any arterial bleeding—control as soon as appreciated
- Controlled by touching with the loop and applying coagulating current.

Techniques of Vascular Control of Prostatic Vessels Differs in Literature

- Mauermeyer approach—early control at 5 and 7 o'clock
  Nesbit technique—at the 11 and 1 o'clock positions

No major difference in bleeding experience with both approaches.

- Large artery or artery thickened by atheroma—more difficult to close, merely by touching with loop
- Useful trick—compress the tissue on one side or other of the orifice and squeeze vessel wall to apply coagulating current to seal
- A larger atheromatous vessel may not be controlled by coagulating its mouth
- Trick is to squeeze the walls together by applying the loop.

Another Useful Trick

- Sealing of the lumen using slow circumferential movements of the loop.
- Simultaneous digital rectal manipulation—useful to expose such vessels.
- 'Bounce' bleeding—fierce jet of blood rebounds off the opposite wall of prostatic fossa.

Trick

- Turn attention to the contralateral wall of prostatic fossa to seek the true source.

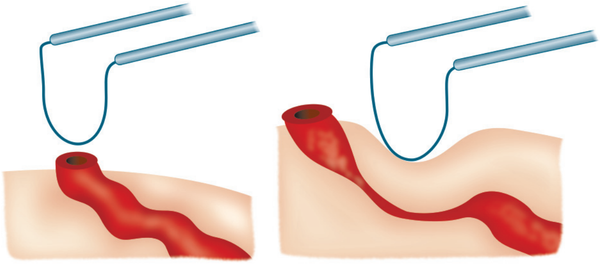

Figure 29.6: Trick to squeeze the walls together by applying the loop

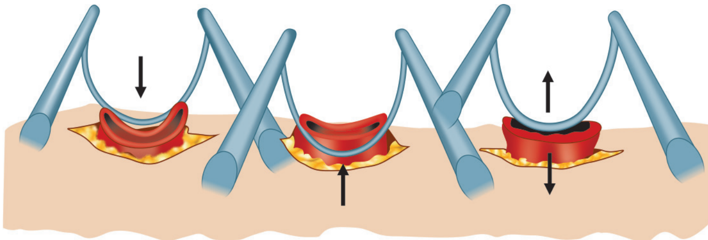

Figure 29.7: Effective coagulation of a large vessel by using slow circumferential movements of the loop

‘Bounce’ (Ricochet) Bleeding

- Bleeder shooting out straight at the telescope with visible red blur.

Trick

- Advance sheath and tilt it to squeeze the vessel coagulate just upstream.

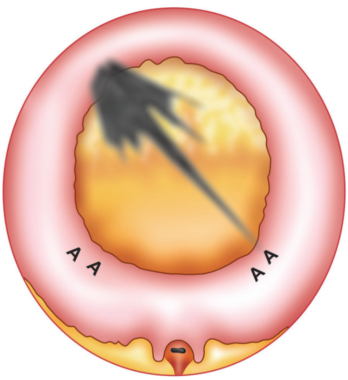

Figure 29.8: Bounce (Ricochet) bleeding

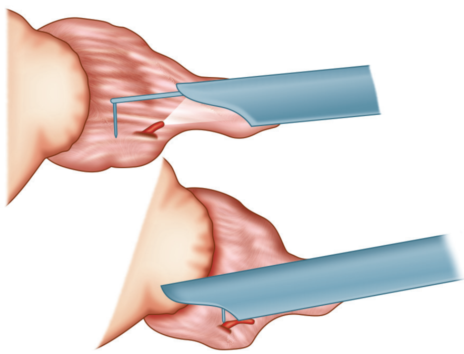

Figure 29.9: An artery pointing straight at scope

VENOUS BLEEDING

- Most of the light oozing comes from small veins.
- Minimized by using a continuous flow Iglesias irrigating system.
- More difficult to detect than arteries as pressure of the irrigating fluid is equal to, or greater than, the pressure in the veins of the pelvis.
- No venous bleeding may be appreciated at all during resection, but as soon as the working element is removed, copious flow of blood is occured.

Trick for Little Veins

- Slow down the inflow of irrigating fluid at the end–little clouds of blood betray the position of veins
- Worth taking time to go over entire surface of capsule
  Large veins, multiple vessels close together—change loop for the roly-ball electrode and apply sparingly.

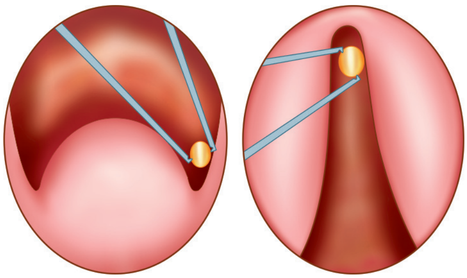

Figure 29.10: Trick to slow down the venous bleeding

What should be Done in Case of Profuse Venous Bleeding?

- Traction by a gauze swab tied around catheter and pulled back onto glans.
- Balloon inflated with sterile water and pulled down.

Role of Endoscopy after Balloon Tamponade

- Keep instruments sterile during tamponade.
- Easier and faster to sort the bleeding while patient on operating table, anesthetized, and equipments ready, than to bring him back from recovery room.

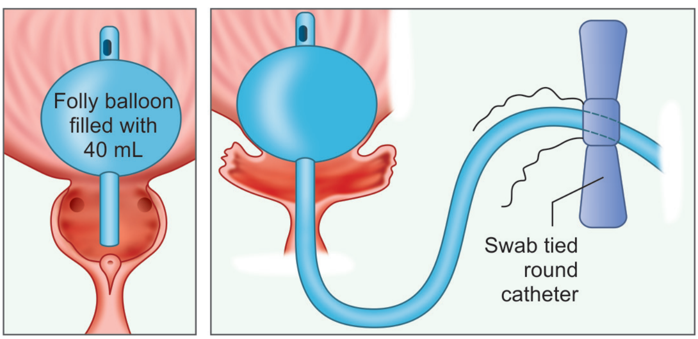

Figure 29.11: Folly balloon catheter

Briskly bleeding arteries just inside the bladder neck at around 12 o'clock position can easily be missed.

TORRENTIAL HEMORRHAGE

- In rare instances, severe hemorrhage may persist
- Open bladder suprapubically.

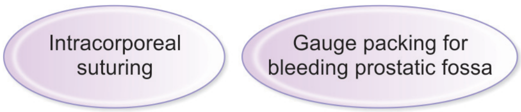

Figure 29.12: Torrential hemorrhage

PATIENTS ON ANTICOAGULANT/ANTIPLATELET DRUGS

- Commonly used drugs in this patient population
- Preoperative cessation—recommended but requires risk assessment of thrombotic complications.

Antiplatelets

- Aspirin and other NSAIDs
- Thienopyridines (Clopidogrel and prasugrel)
- Dipyridamole (phosphodiesterase inhibitor)
- Glycoprotein IIb-IIIa antagonists, such as abciximab and tirofiban.

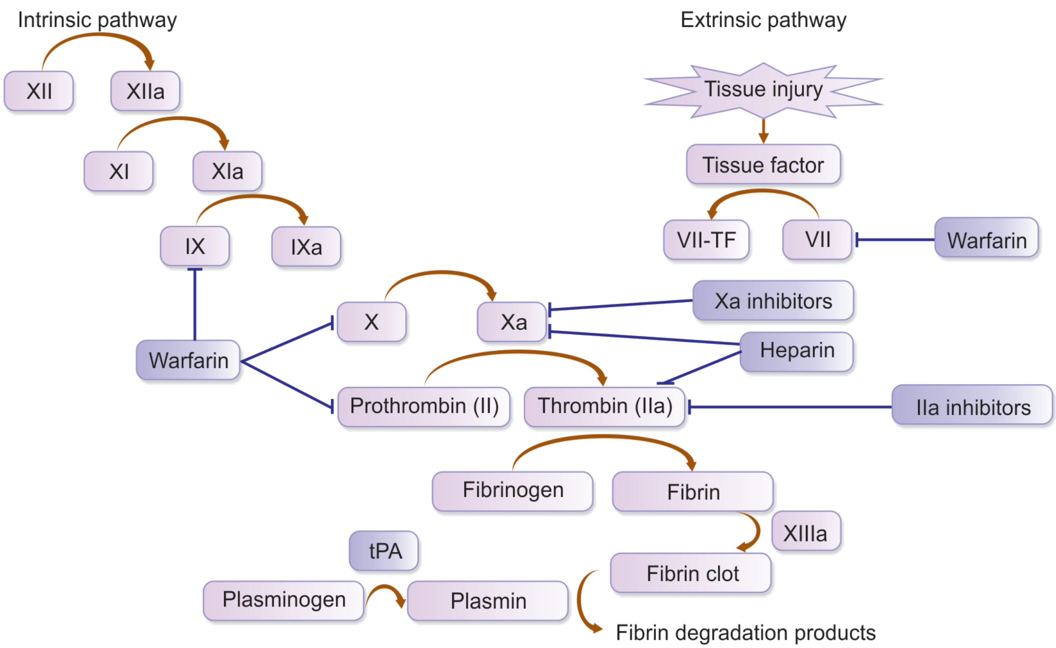

Figure 29.13A

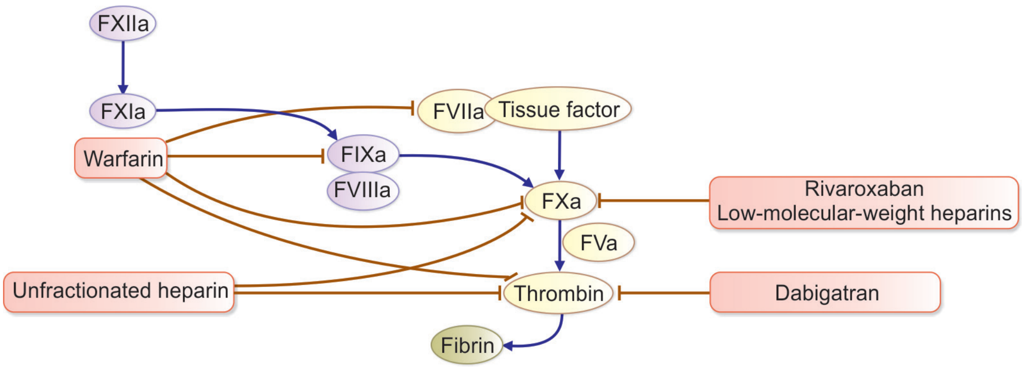

Figure 29.13B

Figures 29.13A and B: Mechanism of action of anticoagulants/antiplatelets drugs

Anticoagulation Guidelines

- Patients at risk—categorized into low and high risk, according to their indication for anticoagulation therapy.
- Low-risk patients → stop warfarin before TURP and recommence after surgery. Patients at high risk → stop taking warfarin 5 days before surgery, with LMWH treatment from 4 days before surgery to 1 day before the operation.
- Low risk patients on warfarin, includes those with a history of:
  - Rheumatic heart disease
  - Atrial fibrillation
  - DVT

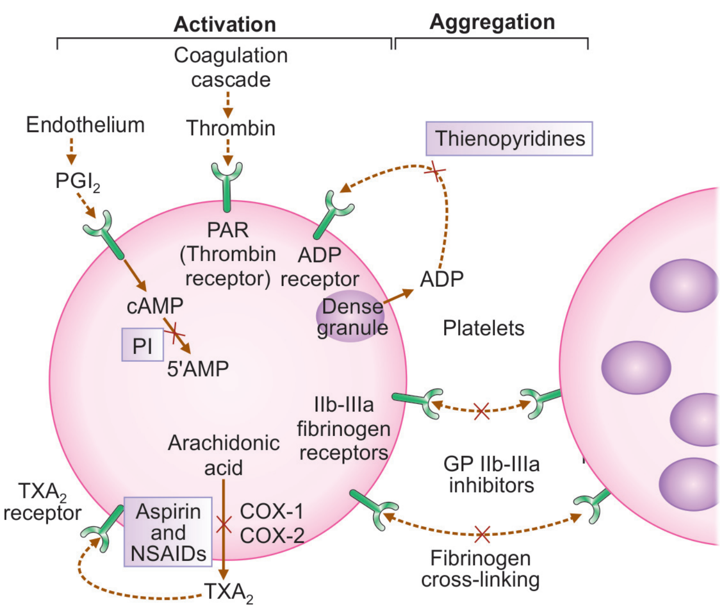

Figure 29.14: Coagulation cascade

- High-risk patients include those with a history of:
  - Intracardiac thrombus
  - Transient ischemic attack
  - Stroke
  - Recent or recurrent DVT
  - Pulmonary embolism
  - Prosthetic valves (especially mitral, mechanical and caged-ball valves).

Stopping Anticoagulation Before TURP Does Not Appear to Increase Perioperative Cardiovascular Complications

- Study enrolling 305 patients:
  - 194 (64%) did not receive anticoagulation therapy
  - 108 (35%) stopped receiving anticoagulation therapy
  - 3 (0.98%) underwent TURP while taking aspirin.
- No significant difference in incidence of:
  - Postoperative hemorrhage (early and delayed)
  - Transfusion rates
  - Cardiovascular events
  - Cerebrovascular events
  - DVT.

In transurethral surgery, patients taking warfarin and antiplatelet drugs had a statistically significant increase in bleeding complications compared to patients taking warfarin alone.

- These complications mainly occurred when anticoagulant and antiplatelet medications were restarted in the postoperative period.
- Study included 51 cases of TURBT, TURP, HoLEP, nephroureterectomy and PCNL with heparinization, compared to 692 cases with no heparinization.

Anesthesia

- Spinal anesthesia generally preferred, reason being the ability to converse and evaluate patient for symptoms of an early dilutional hyponatremia
- Recovery easier with better pulmonary toilet
- General anesthesia can cause cough, which tends to increase hematuria.

Up to 79% of transurethral prostate resections are performed under spinal or epidural anesthesia survey by Mebust et al 1997

- Regional anesthesia was associated with less blood loss than general anesthesia

Other Preventive and Therapeutic Measures

- Inhibitors of 5-alpha-reductase
- Finasteride and dutasteride
- Intraprostatic adrenaline injection
- Role of tranexamic acid
- Selective arterial prostatic embolization (SAPE)—novel, minimally invasive method
- Bipolar TURP.

ROLE OF DUTASTERIDE

Results

- Shorter duration of operation
- More tissue resected
- Less intraoperative blood loss.

Act by decreasing microvessel density of prostate.

Recommendations

Begin Dutasteride 0.5 mg for 1 month before TUR, not only for patients with larger prostate (greater than 80 cm3) but also with smaller prostates (30–80 cm^3).

ROLE OF INTRAPROSTATIC ADRENALINE

Conclusion

- Can be used to reduce blood loss during TURP
- Cardiovascular monitoring should be carried out during its application.

Role of Tranexamic Acid in TURP Bleeding

Tranexamic acid in control of primary hemorrhage during transurethral prostatectomy

- Treatment group received 2 g TXA three times daily on the day of and first day after the operation.

Conclusion

- Significantly reduced operative blood loss
- Treatment reduced the amount of blood loss per gram of resected tissue
- However, TXA treatment did not influence the number of patients requiring a blood transfusion.

Selective Arterial Prostatic Embolization (SAPE)

Treatment of a patient with post-TURP hemorrhage using bilateral SAPE

Patient with post-TURP arterial hemorrhage refractory to conventional endoscopic methods of hemostasis and continuous catheter balloon traction, managed successfully with bilateral selective arterial prostatic embolization.

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30

Transurethral Resection of the Prostate Syndrome

• Ravindra B Sabnis

- TUR syndrome
- Hypoelectrolitemia
- Water intoxication syndrome.

INCIDENCE

- The incidence of mild to moderate TUR syndrome is between 0.5% to 8%
- Reported mortality rate in the region of 0.2% to 0.8%
- Recent larger studies have demonstrated lower incidence rates of between 0.78% to 1.4%
- Severe TURP syndrome is rare; however, its mortality rate, can be as high as 25%.

CERTAIN FACTS

Fluid Absorption

- On average during a TURP, approximately 20 mL of fluid per minute is absorbed
- Approximately 1000–1200 mL in the first hour of resecting time
- One third of this fluid is absorbed directly into the venous system.

Irrigation Fluid

- Non–electrolyte
- Non–conductive of electricity
- Preferably isotonic.

Overload of Non-electrolyte Fluid

- Increase intravascular volume
- Increase in blood pressure
- Decrease protein and electrolytes
- Decrease oncotic pressure
- ↑BP and ↓oncotic pressure—Fluid shift in 3rd space
- Pulmonary edema, increased intracranial tension, brain edema.

Table 30.1: Irrigating fluids

Irrigation fluid	*Advantage*	*Disadvantage*
Sterile water	• Non-toxic, • Inexpensive • Easy to sterilize	Extreme hypotonicity (hemolysis, renal failure)
Glycine 1.2%, 1.5%, 2.2%	• Low cost • 1.5% - less hemolysis than water • 2.2% - isotonic	1.5% - 230 mosm/L (serum – 290 msosm/L) Glycine toxicity
Cytal (2.7% sorbital + 0.54% mannitol)	No toxicity	Expensive 178 mosm/l Reactions in those with fructose hypersensitivity Coma in liver disease
Mannitol 3%	No toxicity	Drives water out of cells – fluid overload Impaired renal function – cannot eliminate mannitol
Glucose 2.5% - 4%		Tissue charring at the site of resection Hyperglycemia Stickiness of gloves and instruments
Urea 1%		Crystallization on the instruments

Note: 1.5% glycine and sterile water are the most widely used irrigating fluids

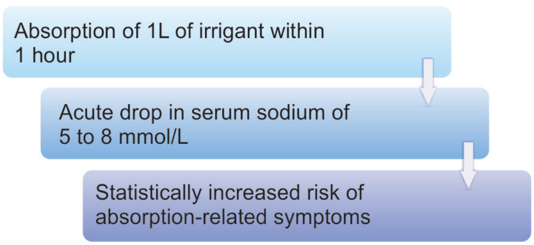

Figure 30.1: Absorption of irrigating fluid in TURP

Pathophysiology of Fluid Overload

- Absorption of small volumes of irrigating fluid via the prostatic sinuses occurs in almost every TURP.

Circulatory Changes

- Both hypertension and hypotension may occur with TURP syndrome
- Hypertension—due to rapid volume expansion (up to 200 mL/min)
- Pulmonary edema from acute circulatory overload
  —In patients with poor left ventricular function
- Hypertension can be followed by prolonged hypotension.

Hypo-osmolality

- The main determinant of CNS deterioration is not hyponatremia itself, but acute hypo-osmolality

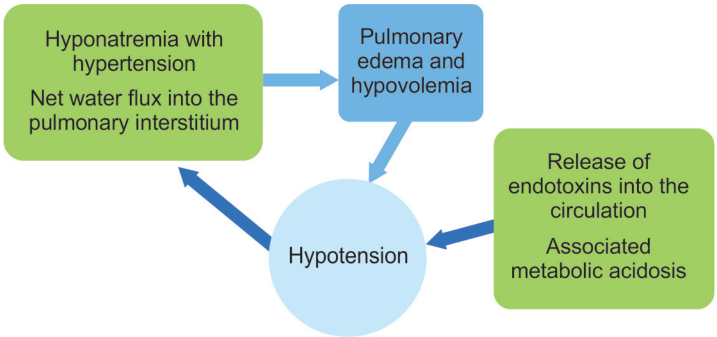

Figure 30.2: Circulatory changes in hypotension

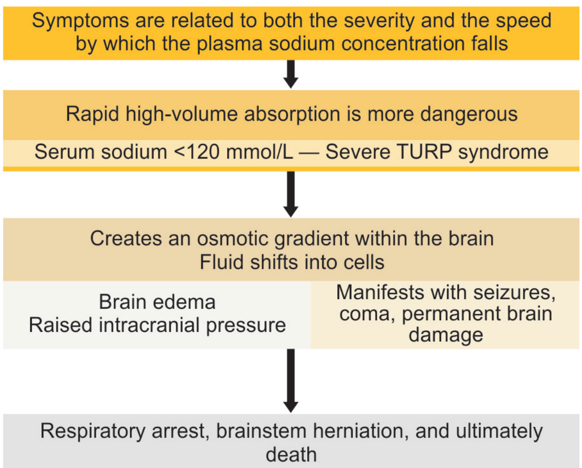

Figure 30.3: Circulatory changes

- Blood-brain barrier is impermeable to sodium but freely permeable to water
- Brain edema and development of cerebral herniation, a few hours postoperatively, is a major cause of death.

Hyperammonemia

- Glycine is metabolized in liver, kidneys and brain into carbon dioxide and ammonia
- Hyperammonemia does not develop in patients undergoing TURP without glycine
- Hyperammonemic encephalopathy due to glyoxylic acid and ammonia
- Blood ammonia >100 mmol/L (normal 10–35) associated with neurologic signs and symptoms.

Hyperglycinemia

- Major inhibitory neurotransmitter like gamma aminobutyric acid (GABA) in the spinal cord and midbrain
- Can cause post-TURP encephalopathy and seizure
- Signs of glycine toxicity include nausea, vomiting, headache, malaise, and weakness
- Glycine is probably a major inhibitory neurotransmitter in the retina
- Visual disturbances can vary in severity from blurred vision to complete blindness
- Vision returns to normal level within 24 hours as glycine approaches.

Presentation

- Can occur as early as 15 minutes after resection starts to up to 24 hours postoperatively
- Symptoms generally do not occur until the serum sodium level is < 125 mEq
- One of the earliest symptoms:
  - Transient prickling and burning sensations in the face and the neck
  - Lethargy and apprehension
  - Yawning
- The most consistent signs are bradycardia and hypertension.

Signs and Symptoms

Table 30.2: Signs and symptoms of disease in different systems

Central nervous system	*Cardiovascular and respiratory*	*Metabolic and renal*
Restlessness	Hypertension	Hyponatremia
Headache	Tachycardia	Hyperglycinemia
Confusion	Tachypnea	Intravascular hemolysis
Coma	Frank pulmonary edema	Acute renal failure
Visual disturbances	Hypotension	
Nausea and vomiting	Bradycardia	

Risk Factors

The risk is increased in patients with

- Prostate size > 45 grams
- Resection time > 90 minutes
- Preoperative relative hyponatremia
- Past or present nicotine abuse (smokers)

Therefore, a TURP is recommended only when the operating surgeon is reasonably convinced of being able to finish the procedure in no more than 90 minutes.

Treatment

- When TURP syndrome is diagnosed intraoperative surgical procedure should be terminated as early as possible.

 - Furosemide should be administered in a dose of 1 mg/kg intravenously. However, the use of furosemide to treat TURP syndrome has been questioned as it increases sodium excretion.
 - Hence, 15% mannitol has been suggested as a better choice, due to its action independent of sodium excretion and its tendency to increase extracellular osmolality.
- Oxygen should be administered by nasal cannula.
- Pulmonary edema should be managed by tracheal intubation and positive pressure ventilation with 100% oxygen.

Mild TUR Syndrome

- Monitor in a high dependency setting until symptoms resolve
- Supportive therapy, including antiemetics
- Bradycardia and hypotension can be managed with atropine, adrenergic drugs, and calcium.

Severe TUR Syndrome

- Severe cases are best treated with slow intravenous administration of a 3% hypertonic saline solution.
- 0.5 mEq/1 per hour, usually 150–200 mL at a time administered over 1–2 hours
- This treatment should always be accompanied by diuretics (intravenous furosemide), especially in patients at risk for developing congestive heart failure
- Monitor electrolytes every 2–4 hours to prevent overcorrection
- Convert from 3% hypertonic saline to normal saline as soon as possible. Avoid an absolute increase in serum sodium of more than 20 mEq/L in a 24-hour period.

Sodium Deficit

Amount of the sodium deficit can be estimated from the following formula:
- Estimated sodium deficit = (125–current serum sodium)(body weight in kilograms)(0.6)
- The amount of saline fluid to completely normalize the serum sodium can be calculated easily by taking the estimated total sodium deficit and dividing it by the sodium content of the replacement saline solution (Normal saline contains 154 mEq/L of sodium and 3% hypertonic saline has 513 mEq/L.)

CNS Complication

- Central pontine mylenolysis has been reported after both rapid correction of serum sodium concentration in TURP patients
- Raising the serum sodium concentration by 1 mmol/L/hr is safe.

Hyperammonemia

- Management of hyperammonemia when glycine irrigant is used include:
  - L-arginine, which acts in the liver by preventing hepatic release of ammonia and accelerating ammonia conversion to urea
  - Infusion of L-arginine with or at the conclusion of glycine administration prevented further increases in blood ammonia concentration and accelerated its return to normal

– Doses between 4 g (20 mmol) infused over 3 minutes and 38 g (180 mmol) infused over 120 minutes have been recommended.

Management of Hyperglycinemia

- Hyperglycinemia may be the cause of TURP encephalopathy through its positive action on N-methyl-D-aspartic acid (NMDA) receptors.
  – Theoretical role of NMDA receptor antagonists (e.g. dextroporoxyphene, ketamine) in seizures.
- Hypomagnesemia due to dilution or loop diuretics can cause seizures:
  – Magnesium exerts a negative effect on NMDA receptors
  – A trial of magnesium therapy may also control seizure.

PREVENTION

Patient Position on the Operating Table

- In the trendelenburg position (20 degrees), the intravesical pressure needed to initiate absorption is 2.5 cm H_2O increasing to 12.5 cm H_2O in the horizontal position
- Thus, the risk of TUR syndrome increases with the Trendelenburg position important especially in high-risk patients.

Operative Time

- Limit the operative time to <60 minutes
- Remember that massive fluid absorption has been documented to occur within 15 minutes of the start of surgery
- Mebust et al (J Urol, 1989) retrospectively reviewed 3885 patients who underwent TURP
  – Resection time > 90 minutes: incidence 2%
  – Resection time < 90 minutes: incidence 0.7%.

Prostate Gland Size

- Patients with larger gland size are at higher risk
  – Gland sizes > 45 g: incidence 1.5%
  – Gland size < 45 g: incidence 0.8%
- Larger glands need longer resection time and are usually subject to greater blood loss with higher levels of irrigant absorption.

Prevention

Fluid Height

- Amount of the irrigation fluid absorbed depend on the height of the irrigating
  – Optimum height should be 60 cm
  – Two fold increase in fluid absorption at 70 cm.
- Though logical, subsequent studies failed to prove increased absorption with increased height.

Operative Experience

- Inexperienced surgeons:
  - The operative time was significantly longer
  - Mean serum sodium levels were lower
- Senior urologic surgeons:
  - Resected four times more tissue per unit time
  - Reduced risk of need for secondary TURP
  - But they operate with greater speed and aggression
  - Leading to earlier capsule breach and greater fluid absorption
- Both have equal incidence of TUR syndrome.

Other Measures

- Premptive intravenous diuretics –large gland
- Low pressure irrigation
  - Suprapubic trocar (lowest intravesical pressure)
  - Suprapubic catheter
  - Intermittent evacuation of irrigating fluid
  - Use of an Iglesias resectoscope
  - Intravesical pressure < 20 cm H_2O – lower absorption (Hahn, Scand J Urol Nephrol 2000).

General Anesthesia vs Regional Anesthesia

- TURP performed under regional anesthesia without sedation (Awake TURP) is preferable to general anesthesia due to the following reasons:
  - Early manifestations of TURP syndrome are better detected in awake patients.
  - Peripheral vasodilatation helps to minimize circulatory overloading.
  - Provides some degree of postoperative analgesia.
  - Blood loss will be less.

Bipolar TURP

- Uses physiologic saline as the irrigant fluid
  - Eliminates the need for hypo-osmolar irrigation used in monopolar TURP.
- Risks of dilutional hyponatremia and TUR syndrome are eliminated, allowing for longer and safer resection.

Laser Prostatectomy

- Holmium laser enucleation of the prostate (HoLEP)
  - No significant change in serum electrolytes and no risk of TURP syndrome
- Photoselective vaporization (PVP) with the GreenLight HPS 120-W laser vs TURP
  - TUR syndrome: 0% vs 5%.

Prevention Summary

- Pre-existing hyponatremia should be identified and corrected, especially in patients on diuretics and low salt diet.
- The ideal height of irrigating fluid is 60 cm.
- The duration of TURP should be restricted to 60 minutes and not >90 minutes
- In cases requiring more duration of resection, staged TURP should be performed.
- Prostatic capsule should be preserved as far as possible and distension of bladder avoided.
- Continuous flow methods have been claimed to decrease fluid absorption
- If all these precautions are taken, TUR syndrome can be avoided.

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31

Bladder Perforation during Transurethral Resection of the Prostate

• V Krishnamurthy

CAUSES

- Instrumentation
- Overdistension
- Deep resection
- Obturator spasm
- Rarely—explosion of hydrogen gas
- Lasers.

CONTENT

- Types
- Endoscopic signs
- If missed—clinical signs
- Intraoperative management
- Continue TURP or abandon?
- Post-management
  - Subtrigonal perforation
  - Intraoperative perforation
- Postoperative outcomes.

TYPES OF PERFORATION

- 1% incidence
- Mostly extraperitoneal
- Intraperitoneal uncommon.

Intraperitoneal Bladder Perforation

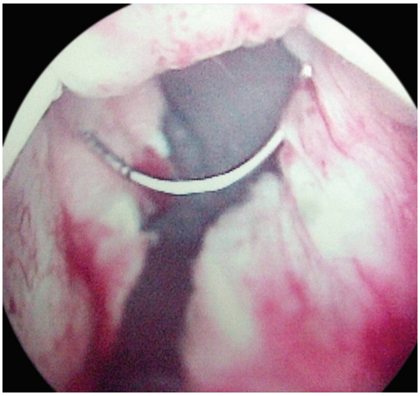

Figure 31.1: Intraperitoneal bladder perforation

Extraperitoneal Bladder Perforation

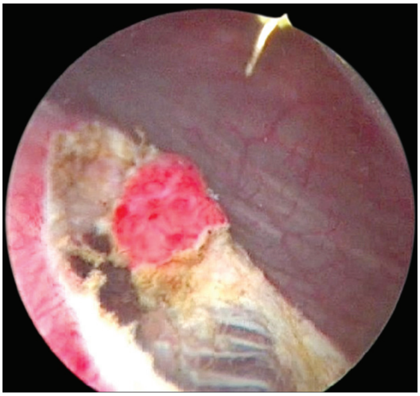

Figure 31.2: Extraperitoneal bladder perforation

Intraoperative Diagnosis

- Nausea and vomiting
- Peritonism
- Associated hypotension
- Decreased irrigation return
- Shoulder pain.

Management

- 90% catheter drainage alone
- Suprapubic drainage
- Intraperitoneal
  - Exploratory laparotomy

- Large subtrigonal perforation
  - Catheterization over a guide wire.

Secondary Complications

- TUR syndrome
- Missed bowel injury
- Intestinal obstruction.

Can Perforation Lead to TURP Syndrome?

- Described after bladder perforation during TURBT
- Slower onset
  - Presents after 1-6 hours
- Occurs due to electrolyte equilibration through the peritoneal membrane
- Prevention is through early diagnosis.

Bowel Herniation into Bladder—Delayed Diagnosis

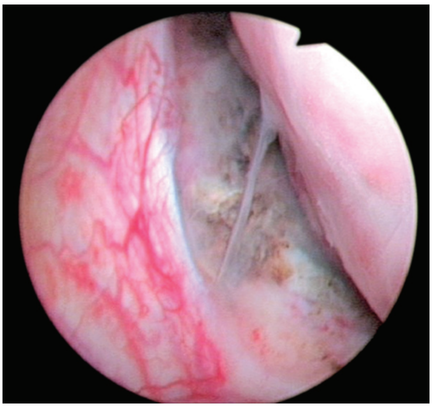

Figure 31.3: Bowel herniation into bladder

CONTINUE TURP OR ABANDON?

- Extraperitoneal/Intraperitoneal
- Abdominal distension.

Intraoperative Management

- Exploration and repair
- Catheterization alone.

Postoperative Outcome

- If detected early and managed well
- GOOD.

Medicolegal Liability

The defendant attempted conservative measures to treat the bladder leak. When the emergency surgery was performed (17 days post-TURP), a rupture of the colon was discovered.

The plaintiff claimed that there should have been diagnostic tests performed and/or exploratory surgery earlier than 17 days subsequent to the TURP. The plaintiff's medical experts testified that the tests performed were neither adequate to measure nor prevent the fluid leakage into the abdominal cavity.

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32

Medical Management

• SK Singh • Ulhas Sathaye • Suresh Bhat

ALTERNATIVES IN MEDICAL MANAGEMENT

• Ulhas Sathaye

MEDICAL THERAPY

- Alpha-blockers
- 5-alpha-reductase inhibitor
- Combination therapy.

OPTIONS IN ALTERNATIVES IN MEDICAL MANAGEMENT

- Phytotherapy
- 5-alpha reductase inhibitors
- Anticholinergic agents
- PDE 5 inhibitors
- Intraprostatic botulinum injections
- Prostatic artery embolization.

PHYTOTHERAPY

- Phytotherapeutic extract
- Saw palmetto
- Pygeum africanum
- Pumpkin seed
- Cernilton pollen
- South African star grass root (beta sitosterol)
- Stinging nettle root
- Opuntia flower (cactus)
- Pinus flower (pine).

Saw Palmetto

- Mechanism of action: 8 theories proposed
- Antiandrogen
- Anti-inflammatory
- Induction of apoptosis
- Naturally acting 5-alpha reductase inhibitor
  Thus it may be expected to reduce size but this is not the case
- A recently published cochrane review concluded saw palmetto was not more effective than placebo for treatment of urinary symptoms consistent with BPH.

Pygeneum Africanum

Mechanism of Action

- It acts on the prostate through inhibition of fibroblast growth factors, has anti-estrogenic effects and inhibits chemotactic leukotrienes.
- No strong clinical data exists of its efficacy, although trials are in progress.

Pumpkin Seed, Rye Pollen, etc.

- No strong clinical data exists of its efficacy, although trials are in progress.

5-ALPHA REDUCTASE ENZYME INHIBITORS

• **SK Singh**

- Finasteride
- Dutasteride
- 5-Alpha enzyme inhibitors.

MECHANISM OF ACTION

- Stops conversion of testosterone to the active dihydrotestosterone (DHT) which is needed for prostatic growth.
- The primary effect of these drugs in BPH is to reduce the size of the prostate gland. They have been found to increase apoptosis (cell death) in prostate epithelial and stromal cells, and decrease the volume of epithelium.
- Baseline prostatic size has a significant impact on its efficacy.
- The best results are seen when the gland size is 40 cc or more.
- Need to be given for a year at least for optimal results.

COCHRANE REVIEW CONCLUSION

- Finasteride improves long-term LUTS
- Long-term combination therapy better than finasteride monotherapy alone
- In comparison to α-blockers, combination with finasteride improves urinary symptoms only in prostates >25 grams.

EFFECTS

- Decrease in gland size (17–30 %)
- Decrease in prostate volume (25%)
- Decrease in DHT levels (60–75%)
- Decrease in symptom score (13–30%)
- Improvement in flow rates by 7–20%.

ADVERSE EFFECTS

- Decreased libido
- Ejaculatory dysfunction
- Impotence
- Decreased semen volume
- Breast enlargement
- Nipple pain
- Increased risk of high grade prostate cancer.

MEDICAL MANAGEMENT IN ISCHEMIC HEART DISEASE (IHD) AND HYPERTENSION

- Safe
- Effective

- Not interfering with the primary medications
- Phytotherapy
- 5-alpha reductase inhibitors
- Highly selective alpha blockers.

Not to use PDE-5 inhibitors because patient may need nitrates for his IHD.

GOALS OF MEDICAL THERAPY

- Rapid symptomatic relief
- Halting progression, thus reducing risk of AUR and need for surgery
- Improving QOL.

MAJOR CONCERN

- Hypotension/vasodilatory side effects.

Silodosin: Safety Analysis

- An integrated safety analysis was performed in patients with BPH receiving an 8 mg once-daily dose of silodosin (n = 733) or placebo (n = 931) for up to 12 weeks of treatment in controlled clinical trials conducted in Europe and in the US.

No increased risk of orthostatic hypotension was observed in elderly patients or in patients receiving concomitant antihypertensive treatments.

CONCLUSION

- As expected for a highly uroselective drug, minimal or no effects on cardiovascular parameters were observed in patients receiving 8 mg of silodosin once daily for the treatment of signs and symptoms of BPH.

ANTICHOLINERGIC AGENTS

Indications

- In patients with BOO and concomitant detrusor overactivity.
- It has to be combined with an alpha blocker.
- To be used when irritative symptoms like frequency and urgency predominate.

Caution recommended when used in men with a high residual urine volume and/or a history of spontaneous retentions.

PDE-5 INHIBITORS

Specifically, the cyclic nucleotide monophosphate cyclic GMP represents an important mediator in the control of the lower urinary tract outflow region.

PDE-5 inhibitors, known to restrain the degradation of the second messenger cyclic GMP offers great opportunities in the treatment of lower urinary tract dysfunction.

- Efficacious
- Rapid onset of action
- Favorable effect to side effect ratio.

Rationale for Use

- The prevalence of BPH, LUTS and ED increases with age.
- PDE 5 inhibition mediates smooth muscle relaxatiion in the lower tract.
- Early clinical evidence demonstrates that PDE5 inhibitors such as tadalafil are successful in treating LUTS and ED.

A large randomized trial concluded that tadalafil 5 mg once daily for 12 weeks resulted in a clinically meaningful reduction in total IPSS score.

Adverse Effects

- Blurred vision
- Headache
- Backache
- Nausea.

BOTULINUM TOXIN A INJECTION

- Injection of botulinum toxin A into the prostate is a novel treatment . For LUTS secondary to BPH.
- Transperineal injection of 100 units of botulinum toxin into each lobe of the prostate under transrectal guidance is required.
- In a randomized controlled trial, thirty patients demonstrated significant improvement in IPSS (65% decrease) and serum PSA (51% decrease) compared to controls, who had injections of saline without botulinum toxin A, at a median follow-up of 20 months.
- No adverse events were noted.

α–BLOCKERS

- Prazosin
- Doxazosin
- Terazosin
- Tamsulosin
- Silodosin
- Alfuzosin.

PRAZOSIN

- Requires multiple dosing
- Sustained release preparation
- First dose phenomenon
- Lowers BP.

TERAZOSIN

- Long acting
- Effect on BP
- Untreated hypertensives
- Significant fall in BP
- Normotensives
- No significant fall in BP.

Table 32.1: Adverse effects of terazosin

	Terazosin (n = 636)	*Placebo (n = 360)*
Postural hypotension	3.9%	0.8%
Dizziness	9.1%	4.2%
Somnolence	3.6%	1.9%
Nasal congestion/rhinitis	1.9%	0.0%
Impotence	1.6%	0.6%
Fatigue	7.4%	3.3%

DOXAZOSIN

- Longer half life (22 hours)
- No clinical advantage compared with terazosin
- Adverse cardiac effect.

Table 32.2: Adverse effects of doxazosin

	Doxazosin (n = 665)	*Placebo (n = 300)*
Dizziness (includes vertigo)	15.6%	9.0%
Fatigue	8.0%	1.7%
Hypotension	1.7%	0.0%
Edema	2.7%	0.7%
Dyspnea	2.6%	0.3%

TAMSULOSIN

- First subtype selective alpha blocker
- Uroselective
- 9.5 times $\alpha 1A > \alpha 1B$ and 2.5 times $\alpha 1A > \alpha 1D$.

Advantage

- No dose titration required
- SE
- Abnormal ejaculation.

Table 32.3: Adverse effects of tamsulosin

	0.4 mg (n = 501)	*0.8 mg (n = 492)*	*Placebo (n = 493)*
Dizziness	14.9%	17.1%	10.1%
Abnormal ejaculation	8.4%	18.1%	0.2%
Asthenia/fatigue	7.8%	8.5%	5.5%
Libido decreased	1.0%	2.0%	1.2%
Amblyopia	0.2%	2.0%	0.4%

ALFUZOSIN

- No dose titration
- Less ejaculatory dysfunction
- Clinical efficacy comparable with tamsulosin.

SILODOSIN

- FDA approved in October 2008
- Most highly uroselective
- 162 times α1A> α1B and 55 times α1A > α1D
- Excellent cardiac and blood pressure safety profile
- Does not cause QT prolongation
- Retrograde ejaculation.

Table 32.4: Adverse effects of silodosin

	Silodosin (n = 466)	*Placebo (n = 457)*
Retrograde ejaculation	28.1%	0.9%
Dizziness	3.2%	1.1%
Diarrhea	2.6%	1.3%
Orthostatic hypotension	2.6%	1.5%
Headache	2.4%	0.9%
Nasopharyngitis	2.4%	2.2%
Nasal congestion	2.1%	0.2%

PRESENT CASE

- Alfuzosin is preferred medication in sexually active male with BPH.

PREDICTORS OF PROGRESSION

- Prostate size > 30 grams
- PSA ≥ 1.5 ng/mL
- Increased age
- IPSS score – Moderate to severe
- Q max < 12 mL/s

PROSCAR LONG-TERM EFFICACY AND SAFETY STUDY (PLESS)

- 3040 patients
- Moderate to severe symptoms
- Finasteride 5 mg vs placebo
- Follow-up 4 years
- Cumulative risk reduction
  - AUR by 57%
  - Surgery by 55%.

EFFECT OF 5α-REDUCTASE INHIBITOR

- Men with larger prostate volumes and higher PSA values experienced clinically significant response to therapy with 5α reductase inhibitors compared to those with smaller prostates and low PSA level.

Table 32.5: Comparison of finasteride and dutasteride

	Finasteride 48 months controlled trial in 3040 men		*Dutasteride 24-month controlled trial in 4325 men*	
Symptom	Finasteride	Placebo	Dutasteride	Placebo
Volume changes	-18%	+14%	-26%	-2%
IPSS reduction	-3.3	-1.3	-4.5	-2.3
Qmax Improvement	+1.9	+0.2	+2.2	+0.6
AUR risk reduction	57%		57%	
Surgery risk reduction	55%		48%	

Source: McConnell JD, N Engl J Med. 1998;338:557-563; Roehrborn CG, Urology.2002; 60:434-441

MEDICAL THERAPY OF PROSTATIC SYMPTOMS (MTOPS)

Cumulative Clinical Progression

17% - Placebo, 10% - alpha blocker, 10% - 5 ARI, 5% - combination therapy.

Combination Therapy

- Reduces
  - The long-term risk of AUR
  - Need for invasive therapy

Combination therapy on the risk of BPH progression

- Double blind; 4844 men at high risk of AUR (mean age–66 years, IPSS – 16.4, prostate size – 55 g, PSA – 4 ng/mL)
- Tamsulosin vs dutastride vs combination
- Combination therapy:
  - Greater symptoms relief
  - Decreased risk of AUR.

Duration of α-blocker

- Symptom relief remains constant after 1 year
- Efficacy may reduce slightly overtime
- Reduces symptoms but not incidence of AUR or need for surgery.

SMART-1: Symptom Management after Reducing Therapy

- α-blocker can be withdrawn after 24 weeks of combination therapy (IPSS < 20)
- Patient with severe symptoms (IPSS > 20) benefit from long-term combination therapy.

5α reductase inhibitors – concern

- Decreased libido
- ED.

Erectile Dysfunction

PDE-5 inhibitor:
- Tadalafil alone
- Along with α-blocker.

Combination therapy:
- Medication for one problem may be useful in improving another problem
- Common approach for managing LUTS and ED may be advised
- Combination of tamsulosin and tadalafil is more effective in alleviating LUTS.

TAKE HOME MESSAGE:
MEDICAL MANAGEMENT OF BPH

• **Suresh Bhat**

BPH : CHRONIC AND PROGRESSIVE DISEASE

- Alpha blockers: Rapid onset of action: Dynamic component of BOO affected
- No effect on PSA
- With alpha blockers tachyphylaxis is not felt after 1 year and hence can be given for longer periods
- Only 5 ARI's modify the natural history: Reduce the size and hence the static component of BOO—takes 6–12 months
- PSA reduced by 50%.

Treatment based on

- Patient age
- Comorbidity
- QOL
- Sexual health
- Risk of disease progression
- Patient preference
- Economics and treatment availability.

Risk Factors for Progression

- Age >62 year
- Qmax <10.6 mL/s
- Prostate volume >31 mL
- PSA >1.6 ng/mL
- PVR >39 mL.

BPH

- Part of metabolic syndrome
  - DM
  - HTN
  - DLP
  - Obesity
- Hence, while prescribing drugs for BPH, be cautious.

No Risk Factors for Progression

Alpha Blockers

Young patients: Alfuzosin SR
- Does not interfere much with sexual life
- May interfere with sperm motility and maturation

Elderly : Alfuzosin SR/Tamsulosin/Silodosin
- Increased risk of IFIS with these

With hypertension: Treat both separately (ALLHAT): Doxazosin

Increased Risk of Cardiac Failure

- Treat with single drug: Left to the physician (Campbell's 10th ed)
  - Terazosin or Doxazosin
- QTc prolongations + : Avoid alfuzosin (Lepor et al 2008)
  - Leads to torsades de pointes—Ventricular fibrillation— sudden death
  - IHD: Alfuzosin SR/Tamsulosin/Silodosin
- ED: Alfuzosin + sildenafil (Kaplan et al 2007)
- IHD + ED: Do not give PDEIs along with alpha blockers
- Duration: Maintain action for several years (Chapple et al 2006).

Risk Factors for Progression Present

Combination therapy/5 ARIs alone
- Medical therapy of prostatic symptoms (MTOPS)
- Proscar long-term efficacy safety study (PLESS)
- SMART1 (symptom management after reducing therapy) : Stop alpha blockers after 6 months and continue with 5 ARIs

Proscar Long-term Efficacy and Safety Study (PLESS)

- Finasteride-5 Mg vs Placebo for 4 years
- Prostate-55 grams.

	AUR	*Surgery*
Placebo	7%	10%
Finasteride	3%	5%

- In those men with prostate volumes greater than 55 cm^3, the risk reduction of AUR and/or surgical intervention for finasteride was 70%.

Definition of Progression in MTOPS

- A 4-point rise in the score, confirmed by a second visit within 4 weeks;
- A 50% increase in creatinine relative to baseline levels;
- AUR;
- Two or more UTIs within 1 year or a single episode of urosepsis due to BOO; and
- Socially unacceptable incontinence.

MEDICAL THERAPY OF PROSTATIC SYMPTOMS (MTOPS) TRIAL

- ARMS:doxazosin, finasteride, a combination of both, or placebo.

Doxazosin	*Finasteride*	*Combination*
39%	34%	67%

- Less likely to experience progression.

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33

Nocturia

• Rajeev TP

DEFINITION

- Nocturia is the complaint that the individual has to wake up at night one or more times to void.
- Does not differentiate between pathological and non-pathological nocturia.
- Does not include the degree of symptom.
- Each void must be preceded and followed by sleep, i.e. the first morning void is not included
- It is independent of the trigger for waking
- It depends on the time spent sleeping and not on the time spent in bed, i.e. it does NOT include:
  - Voids after going to bed but before going to sleep
  - Voids that prevent going back to sleep.

Nocturia should not be confused with ...

- Nocturnal enuresis
- It signifies voiding while remaining asleep. Does not count as nocturia because the patient fails to wake when passing urine.

Prevalence

Table 33.1: Study and prevalance for nocturia

Study	*Prevalence*
BACH study (n=5500) (Fitzgerald et al. 2007)	Male = 25.2% Female = 31.3%
EPIC study (n=19,000) (Irwin et al. 2009)	Male = 48.6% Female = 54.5%

Prevalence of Nocturia in Men in Relation to Age

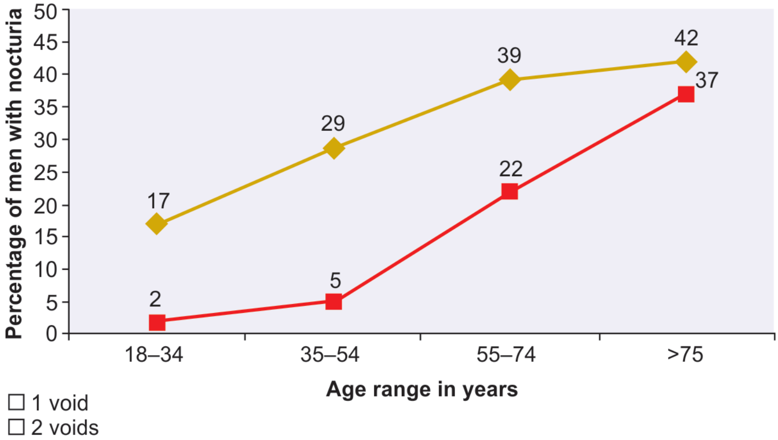

Figure 33.1A: A Prevalence of nocturia in men in relation to age
Source: Van Dijk et al. BJU Int 2002

Prevalence of Nocturia in Women in Relation to age

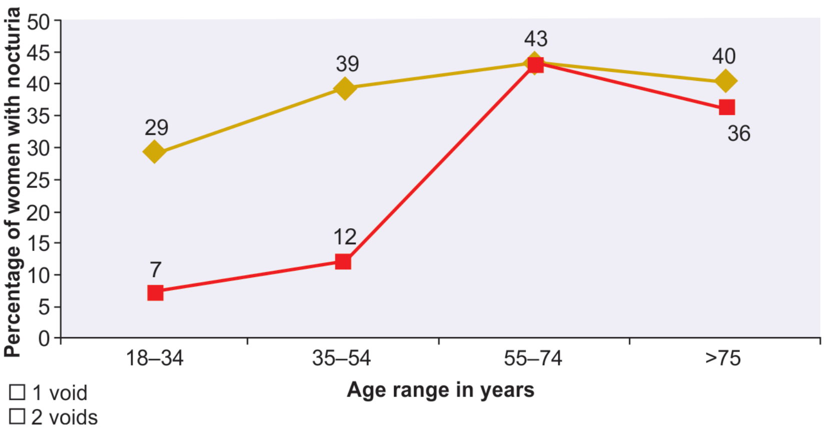

Figure 33.1B: Prevalence of nocturia in women in relation to age
Source: Van Dijk et al. BJU Int 2002

IMPACT OF NOCTURIA IN QOL

- Nocturia is a bothersome condition
  - 67% of males
  - 63% of females.
- It negatively affects QoL by causing:
  - Lack of sleep results in decreased productivity at work
  - Low energy levels resulting in significant levels of indirect and intangible costs to society.

NOCTURIA PATHOPHYSIOLOGY

- Nocturnal polyuria
- Diminished nocturnal bladder capacity and/or global bladder capacity
- Sleep impairment.

Nocturnal Polyuria

- Behavioral (e.g. excessive evening/night time fluid intake, polydipsia, drug-induced diuresis)
- Global polyuria (e.g. poorly controlled diabetes mellitus, diabetes insipidus, DIDMOAD syndrome, panhypopituitarism)
- Release of fluid and electrolyte sequestration (e.g. congestive heart failure, peripheral edema, venous stasis)
- Obstructive sleep apnea
- Renal tubular dysfunction (e.g. diuretic phase of acute tubular necrosis, nephrotic syndrome)
- Hepatic failure
- Hypoalbuminemia.

Diminished Nocturnal Bladder Capacity and/or Global Bladder Capacity

- Storage failure:
  - Detrusor overactivity; idiopathic or nocturnal detrusor overactivity, neurogenic bladder dysfunction
  - Increased filling sensation; overactive bladder
- Voiding failure leading to post-void residual: Bladder outflow obstruction, reduced detrusor contractility, dysfunctional voiding, neurogenic bladder dysfunction
- Inflammatory or painful conditions of the urinary tract (e.g. urinary tract or genital infection, bladder pain syndrome, bladder or ureteric calculi, malignancy).

Sleep Impairment

- Environmental
- Anxiety disorders
- Stimulants
- Circadian disruption (e.g. melatonin deficiency of aging).

EVALUATION

- Detailed history:
  - Hematuria, pain, recurrent UTI

- Bladder filling symptoms
- Voiding symptoms
- Fluid/dietary habits
- Medication, e.g. diuretics
- Nocturnal dyspnea/cardiac symptoms
- Sleep disturbance, e.g. snoring/apnea
- Neurological abnormalities
- Menopausal symptoms
- Relevant surgery.

- Physical examination:
  - Body mass index
  - Pelvic mass
  - Prolapse/digital rectal examination
  - Estrogen status
  - Sacral/lower limb neurological
  - Cardiovascular system.

LABORATORY INVESTIGATIONS

- Urinalysis
  - Dipstick
  - Microscopy, culture and sensitivity.
- Voiding diary: Frequency/volume chart for 4 days in women and 3 days in men
- Post-void residual
- Quality of life questionnaire, e.g. ICIQ-N.

ICIQ-N

Intended to be:

- Self-completion questionnaire to assess the symptom of nocturia and its impact
- Universal and condition-specific
- Applicable to a wide range of individuals of adult men and women
- Comprehensive and psychometrically robust
- Of use in epidemiological and outcomes research as well as routine clinical practice
- Short and simple with two symptom questions:
  - Daytime and night-time urination
  - QoL assessed

Evaluation Algorithm

Initial number

ICIQ-N 08/04

CONFIDENTIAL

DAY MONTH YEAR
Today's date

Nocturia

Many people experience urinary symptoms some of the time. We are trying to find out how many people experience urinary symptoms, and how much they bother them, we would be grateful if you could answer the following questions, thinking about how you have been, on average, over the PAST FOUR WEEKS.

1. Please write in your date of birth: DAY MONTH YEAR

2. Are you *(tick one)*: **Female** ☐ **Male** ☐

3a. How often do you pass urine during the day?

hourly ☐	3
every two hours ☐	2
every three hours ☐	1
every four hours or more ☐	0

3b. How much does this bother you?
Please ring a number between 0 (not at all) and 10 (a great deal)

0 1 2 3 4 5 6 7 8 9 10
not at all ... a great deal

4a. During the night, how many times do you have to get up to urinate, on average?

none ☐	0
one ☐	1
two ☐	2
three ☐	3
four or more ☐	4

4b. How much does this bother you?
Please ring a number between 0 (not at all) and 10 (a great deal)

0 1 2 3 4 5 6 7 8 9 10
not at all ... a great deal

Thank you very much for answering these questions.

(Source: Wein A, et al BJU Int. 2002)

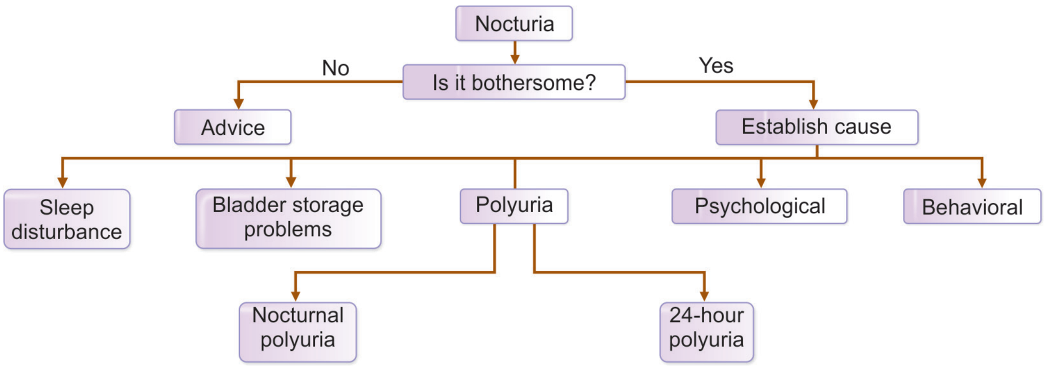

Figure 33.2: Symptoms of nocturia

MANAGEMENT

1. Health and lifestyle issues affecting sleep quality.
2. Optimizing management of systemic conditions.
   a. Optimizing management of known conditions likely to affect nocturnal urine output
   b. Identifying previously unrecognized conditions likely to affect nocturnal urine output
   c. Adjusting nature and timing of drugs used to treat otherwise unrelated systemic conditions.
3. Managing renal fluid and solute load
   a. Overall volume of oral intake
   b. Nature and timing of fluid and solute intake
   c. Endogenous fluid shifts.
4. Increasing bladder reservoir capacity
   a. Reducing storage LUTS
   b. Improving bladder emptying in voiding dysfunction (bladder outlet obstruction, reduced detrusor contractility).
5. Hypnotics and restoration of circadian pattern.
6. Pharmaceutical suppression of nocturnal renal output.

Health and Lifestyle Issues Affecting Sleep Quality

- As nocturia is interdependent of sleep disturbances
- Attention to improve the sleep environment
- Cognitive behavior therapy and relaxation techniques in comorbid insomnia
- Educating patients on “sleep hygiene”
- Gentle exercise increases the “arousal threshold bladder volume” and also improves day-time urinary frequency
- Depressive symptoms increases the incidence of nocturia.

Optimizing Management of Systemic Conditions

- Optimizing management of known non-urological conditions affecting nocturnal urine output:
  - Cardiovascular disease
  - Endocrine disorders
  - Renal failure
  - Obstructive sleep apnea (OSA).
- Adjustment of the nature and timing of drugs like diuretics, SSRIs, calcium channel blockers, and lithium.

Managing Renal Fluid and Solute Load

- Reducing fluid intake about 4 hours prior to bedtime, e.g. caffeine and/or alcohol
- Limiting excessive food volume intake prior to bedtime, e.g. fruits, vegetables
- In those with dependent edema:
  - Adequate exercise
  - Elevating leg in the afternoon above heart level
  - Compression stocking
- Emptying bladder before going to bed.

Increasing Impaired Bladder Capacity

Storage LUTS

- α-adrenergic antagonists
- Naftopidil
- Celecoxib
- α-adrenergic antagonists and 5α-reductase inhibitors
- Combination treatment with antimuscuranics/zolpidem
- TURP.

Overactive bladder (OAB)

- Antimuscarinic drugs.
- Voiding dysfunction in presence of significant post-void residual
  - Intermittent self catheterization at bedtime.

Hypnotics and Restoration of Circadian Pattern

- Hypnotic sedatives administered affects nocturia.
- The benzodiazepine oxazepam reduced nocturia 63%.
- Sedatives improves return to sleep, rather than in improving nocturia frequency.
- Exogenously administered melatonin can counteract some of the associated sleep impairment.
- Melatonin in isolation has been used for treatment of nocturia in men with BPE.
- Comparing melatonin supplementation with hypnotic agent rilmazafone in elderly patients: showed reduction in the number of nocturnal voids.

Pharmaceutic Suppression of Nocturnal Renal Output

- Diuretics
- Prevent water accumulation by forcing water out of the system
- May be helpful in patients with lower limb venous insufficiency or congestive cardiac failure
- Bumetanide 1 mg po in afternoon
- Furosemide 40 mg po in afternoon
- Antidiuretics
  – Helps retain water until a more appropriate time
  – Reduce nocturnal voids and voided volume
- Desmopressin 0.1 mg po titrated to 0.4 mg
  – No direct bladder effect
  – No direct cardiovascular actions.

Safety of Desmopressin

- The main side effects include headache, nausea, dizziness, diarrhea and abdominal pain
- Hyponatremia can develop within 7 days of starting treatment or increasing the dose and recurs in those who are retreated
- Overall reported adverse events from clinical trials were mild and had a frequency of about 5%
- There is no evidence of tolerance or increased risk of hyponatremia in long-term extension trials.

Desmopressin and Hyponatremia

- Hyponatremia occurs mainly in elderly patients (>65 years old) with:
  – Low creatinine clearance
  – Large 24-hour total urine volume (>30 mL/kg)
  – Low basal serum sodium (<135 mmol/L).
- To avoid hyponatremia:
  – Screen using bladder diary
  – Check serum sodium after 3 and 7 days of starting treatment or increasing dose
  – Ensure urine output <2 L/day.

CONCLUSION

- Nocturia is prevalent, bothersome and multifactorial
- Diagnosis and treatment can follow a specific algorithm depending on etiology
- Voiding diaries are essential part of management
- Treatment is aimed at main underlying cause
- Treat conservatively initially
- Pharmacological treatment options include
  – Antimuscarinics for overactive bladder syndrome
  – Antidiuretics (desmopressin) for nocturnal polyuria
  – Diuretics for congestive cardiac failure
  – Hypnotics in insomnia.

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Cancer in Prostate and Benign Prostatic Hyperplasia

• Anant Kumar • Jagdeesh N Kulkarni • Hemant B Tongaonkar

RENAL TREATMENT AFTER RADICAL PROSTATECTOMY

• **Anant Kumar**

RENAL TREATMENT IN A PROSTATE CANCER

- Prostate cancer (PC) is different from other cancer.
- About 70–80% are indolent.
- Will they remain indolent under immunosuppression?
- What is recurrence rate after successful radical therapy of localized PC?
- Life on dialysis –mortality while waiting vs risk of recurrence.
- When to do treatment after RP/RT– will depend all these factors!!!!.

BIOCHEMICAL RECURRENCE AFTER RADICAL PROSTATECTOMY

- Depends upon– stage, Gleason score, PSA level, volume of tumor, family history, age
- Incidental time, PSA<10, few cores, low volume, GS 3+3- may not kill a patient—Need AS
- Is it true after Immunosupression—do not know
- Intermediate tumour – will it become aggressive—do not know
- So how long one should wait– 1, 2 or 5 years—do not know
- Biochemical recurrence after RP for prevalent versus incident cases of PC: implications for management 1923 men from a prospective PC screening study who underwent RP - 1989 and 2002. Cox regression multivariate analysis to determine- PPC vs IPC was associated with the time to PSA failure after RP after adjusting for PSA level, Gleason score, clinical tumor (T) classification, and year of RP.

Biochemical Recurrence after RP-Result

- Men with PPC had higher PSA levels ($P < .001$) and more advanced clinical T classification ($P < .001$) than men with IPC. After a med follow-up of 6.1 years, factors that were associated with a significantly shorter time to PSA failure after RP.

- PPC-AHR—1.8; 95% CI—1.3–2.6; P = .0005
- Baseline PSA–AHR, 1.07; 95% CI, 1.04–1.09; P < .001),
- GS-7 disease (AHR, 2.5; 95% CI, 1.9–3.3; P < .001),
- GS-8 to 10 disease (AHR, 2.3; 95% CI, 1.5–3.5; P < .001),
- Year of RP (AHR, 0.92; 95% CI, 0.86–0.97; P = .003)
- Men with prevalent PC also had worse outcomes after adjusting for their more advanced pathologic features.

Current Recommendations

- The risk of dying during 5 years of dialysis is approximately 59%, whereas the risk of PC recurrence after surgery is generally much lower.
- Reviewed the Memorial Sloan-Kettering cancer center (MSKCC), New York's PC database to identify patients on dialysis under-going RP. Clinical and pathologic features were analyzed to determine the likelihood of disease recurrence.

Results

- Two patients with end stage renal disease (ESRD) in their PC database: Both men had elevated serum PSA detected during routine pretransplantation evaluation, and biopsy confirmed the PC. Both opted for surgery, with pathologic analysis revealing organ-confined disease and negative surgical margins. The postoperative nomogram predicted 7-year progression-free probabilities of 95% and 98%. Given the high likelihood of cure of their PC, immediate consideration for renal transplantation seemed appropriate for both patients.
- Conclusions: PSA-based screening of the dialysis population has ensured earlier detection of PC. Given that nomograms will accurately predict the risk of PC recurrence, the time a patient must wait for a transplant should be based on this individualized risk assessment rather than on a general rule (*Editorial comment-J Urol.*
- The relationship between immunosuppression and PC is not well understood. After treatment of localized PC the appropriate amount of time to wait until safe transplantation is uncertain but has been reported to be as much as 5 years. The authors argue that this length of time may unnecessarily preclude transplantation for many men with well controlled prostate cancer. In a competing risk analysis using prostate cancer prognosis from nomograms (as previously described by the authors) and survival data on dialysis from registries such as the United States Renal Data System the prognosis for men with organ confined moderate Gleason grade prostate cancer may be more favorable than dialysis survival. The ability to predict accurately the prognosis of prostate cancer makes a routine waiting period before transplantation unnecessary unless the risk of early progression is considered significant (*David A. Goldfarb, M.D.).*

Renal Treatment and PC

- Immediate renal treatment after RP for low risk prostate cancer;
- Medline search-five series which examined biomedical computation review (BCR) after RP for low risk cancer at 1,2 and 5 years
- Likelihood of BCR at 1.2 and 5 years was identical in low risk cancer and did not exceed 5%
- So, there is no evidence to wait long
- One can do treatment within 1 year.

CONCLUSION

- If PSA is raised in CRF pat being worked for kidney treatment: patient should exclude cancer prostate
- If present, go for RP for low risk and intermediate risk—If patient is cancer free, should go for treatment within a year
- For high risk localized disease—after successful therapy on has to wait for 2–5 years?

INCIDENTALLY DETECTED CARCINOMA PROSTATE AFTER TURP

• **Jagdeesh N Kulkarni**

CLINICAL ISSUES

- TURP is a standard surgical treatment for symptomatic benign prostatic hyperplasia (BPH)
- Most prostate cancer patients are currently diagnosed by biopsies indicated for elevation of prostate-specific antigen (PSA)
- However, adenocarcinomas are still found in histopathological examinations of surgical samples (TURP) of patients with diagnosis of BPH
- This is not surprising since, many patients undergo the surgery for symptomatic BPH with elevated PSA and negative prior biopsies
- A different situation occurs with incidental finding of tumors that would never have been detected if the surgery had not been indicated; they would not have produced symptoms or increased PSA values (in the Past Occult Ca P at Necropsy)
- It is believed that CZ tumors—less aggressive and TRUS biopsy negative
- Treatment options have to be tailored according to patients and stage of the tumor
- PSA : Prostate specific antigen.

STAGING OF POST-TURP CARCINOMA PROSTATE

- T1a : < 5% of TURP tissue cancer and Gleason <7.
- T1b: > 5 % of TURP tissue cancerous and Gleason >7.
- Criticism:
  - Based on historical small trials.
  - Transitional zone biopsy not representative of cancer in peripheral zone.
  - Not uniformly found predictive of progression.

PROSTATE CANCER—STAGES

- Stages T1—T3
- Stage—T4
- Present incidence of T1a and T1b tumors
- Decreased from pre-PSA era of 15–23% to presently 4–6%.
- Some Western series report 80% to be T1a
- However, some series where PSA screening in population is not done, report 50% of cases to be T1b cases
- AUA 2012: Study from 1996–2011,6/558 TURPs showed Ca P 1.1% with GS 3+3=6, PSA <2.5, Cancer Vol 1–19%.

FACTORS PREDICTIVE OF RESIDUAL DISEASE AND BIOCHEMICAL RECURRENCE

- On analysis of post-TURP RP data:

  - Pre- and post-TURP PSA. Post-TURP PSA of 1 – 2.5 ng/mL predictive of residual prostate cancer of 0.9 cc
  - Gleason score—7 and >7.
- T1a/b NOT predictive.
- Prior medical therapy for BPH-5-alpha reductase.

TECHNICAL CHALLENGES DUE TO TURP

- RP technically challenging both open or robot-assisted laparoscopic prostatectomy (RALP)
- Increased margin positivity, and CP positivity
- Possible worse functional outcome (pre-existing LUTS, sphincter damage during TURP, RP difficulty, nerve sparing difficult)
- RT: Prostate anatomy altered
- Focal ablative therapy investigational.

PROGRESSION RATES IN T1A AND T1B DISEASE

- T1a
  - 5% after 5 years and 10% after 10–13 years.
- T1b :
  - Aggressive course
  - 19% progression despite RP over 10 year.

MANAGEMENT OF POST-TURP OF PROSTATE CANCER (Ca P)

- Will have to be decided on following factors and not on only T1a or T1b staging:
  - Pre-TURP PSA if available
  - Post-TURP PSA
  - DRE findings
  - LUTS
  - Histopathological findings
  - Life expectancy
  - Patient expectation, compliance
  - T1a Ca P: Management options
  - Watchful waiting
  - Restaging with TRUS biopsy (PZ).
- Active surveillance
  - Restaging with TRUS biopsy (PZ).
- Radical prostatectomy
- Radiotherapy
  - < 10 year life expectancy: Conservative approach.
  - > 10 year life expectancy: Individualize decision and discussion with patient as natural history less well known as compared to T1c cases.

Management of T1b Cases

- Aggressive approach justified due to uniformly high progression rate reported
- Intermediate risk category
- Radical prostatectomy
- Radical radiotherapy.

Our Experience of RP in Post-TURP Patients

- Total number of retropubic radical prostatectomies (n = 428)
- RP after TURP (n = 148; 34%) subdivided into:
  - Prior TURP < 1 year of Ca P diagnosis (n = 36, group A)
  - Prior TURP > 1 year of Ca P diagnosis (n = 112, B group)
  - Without prior TURP (n = 280, group C).

Presentation

Table 34.1: Presentation for post-TURP and non-TURP

Presentation	*Post-TURP (A) (n = 36)*	*Post-TURP (B) (n = 112)*	*Non-TURP (C) (n = 280)*
Mean Age (Years)	58.3	65.3	63.2
LUTS	36 (100)	78 (70)	207 (74)
Acute urinary retention	4 (11.2)	9 (8)	12 (4.3)

Intraoperative Parameters

Table 34.2: Intraoperative parameters for post-TURP and non-TURP

Parameters	*Post-TURP (n = 148)*	*Non-TURP (n = 280)*
Mean operative time	200 mins	160 mins
Blood loss	700 ML (500–1200 mL)	500 mL (300-1000 mL)
Blood replacement	18 (12.2)	20 (7.1)
Dissection	More difficult in bladder neck and apex area	Comparitably easy

Early Complications

Table 34.3: Early complications in post-TURP and non-TURP

Complications	*Post-TURP (n = 148)*	*Non-TURP (n = 280)*
Urinoma/urine leak	4 (2.7)	4 (1.4)
Urinary retention	3 (2.02)	4 (1.4)
Major wound infection	3 (2.02)	3 (1.07)
Minor wound infection	3 (2.02)	8 (2.8)
Lymphorrhea	3 (2.02)	4 (1.4)
Catheter expulsion	2 (1.35)	4 (1.4)
Total	**18 (12.1%)**	**27 (9.6%)**

Late Complications

Table 34.4: Late complications in post-TURP and non-TURP

Complications	*Post-TURP (n = 148)*	*Non-TURP (n = 280)*
Bladder neck contracture	8 (5.4)	4 (1.4)
Urethral stricture	4 (2.7)	2 (0.7)
Lymphocele	6 (4.05)	3 (1.07)
Total	**19 (12.2%)**	**9 (3.2)**

Positive Margins

Pathology

Table 34.5: Pathology of positive margine in post-TURP and non-TURP

Margins	*Post-TURP (A) (n = 36)*	*Post-TURP (B) (n = 112)*	*Non-TURP (n = 280)*
Inferior	7 (19.5)	19 (17)	27 (9.6)
Upper	2 (5.6)	2 (1.8)	25 (8.9)
Both	1 (2.6)	7 (6.2)	15 (5.4)
Negative	26 (72.3)	84 (75)	213 (76.1)
VAS	9 (25)	17 (15)	35 (12.5)
SV	17 (47.3)	50 (44.5)	100 (35.8)
LN	7 (19.5)	28 (25)	43 (15.3)
Capsule	10 (27.8)	19 (17)	58 (20.7)

Table 34.6: Continence (continent 1 year after surgery)

Continence (weeks after surgery)	*Post - TURP (A)(n = 36)*	*Post-TURP (B) (n = 112)*	*Non-TURP (n = 280)*
2 weeks	6 (16.7)	20 (17.8)	53 (18.9)
3–4 weeks	7 (19.5)	21 (18.7)	49 (17.5)
6 weeks	1 (2.8)	4 (3.6)	12 (4.3)
12 weeks	2 (5.6)	7 (6.3)	21 (7.5)
1 year	16 (44.5)	53 (47.3)	135 (48.2)
Total continent patients	**32 (88.9)**	**105 (93.7)**	**270 (96.4)**
Incontinent	**4 (11.2)**	**7 (6.3)**	**10 (3.6)**

SUMMARY

Radical Prostatectomy in Post-TURP

- Among 428 patients—36 (8.5%)
- PSA 4–10 ng/mL, all had T1a,
- GS 6 in 58%, 7in 28%, 8 in14%
- Early complications:12% blood loss:700 ccs

- Late complications: 8%
- Positive surgical margins in 10/36
- Continence: 88%
- Technically challenging but acceptable results.

Post-TURP RALP

- 12/100 (H/o TURP prior to RALP).
- The average blood loss—450 mL.
- The 3 patients out of 12 had SUI.
- The average operative time was 244 minutes.
- The surgical margins are positive at base of the prostate in 2 patients but PSA values reached to 0.05 as an average.
- Bladder neck reconstruction-needed in 2/12.

Table 36.7: Post-TURP RALP

Parameter	*Non-Post-TURP (n = 88)*	*Post-TURP (n = 12)*
Duration of surgery (min)	195	244
Amount of blood loss	170	450
Surgical margins	13/69	3/11
Bladder neck reconstruction	2/69	2/11
Postoperative PSA	0.05	0.04
Upgradation of grade	No	No
Post-operative hemoglobin drop	0.9	1.4
Stress urinary incontinence	6/69	3/11

CONCLUSION

- Patients with prostate cancer found after TURP are a heterogeneous group, including some with high preoperative suspicion of neoplasia and others with incidental tumors
- TURP as diagnostic tool is useful in selected cases:
  - High PSA values with Obstructive symptoms and Negative biopsies
  - Many lurk cancer in the transitional/CZ zone, although not exclusively
- TURP helps in relieving urinary obstruction and at the same time obtains a good amount of tissue for histopathological analysis
- This should not be performed in the absence of obstruction
- PSA decreases to normal values in most patients after TURP
- The residual prostate should be completely biopsied increasing the chances to detect cancer if suspected and more so when surveillance is the option
- Radical prostatectomy after TURP may present some technical difficulties but in experienced hands it has an excellent oncological and functional outcomes.

CLINICAL SCENARIOS

• **Hemant B Tongaonkar**

CASE 1—INCIDENTAL PROSTATE CANCER ON TURP

- Patients with BPH may undergo TURP and develop prostate cancer subsequently or may have prostate cancer detected in the TUR chips
- Incidence of incidentally detected Ca P on TURP decreasing with time (4.2–6.4% in patients with normal PSA and DRE)
- Whether TURP is a high risk factor impacting survival a contentious issue
- Optimum treatment much debated issue
- Radical prostatectomy is being increasingly practiced for incidental or subsequent prostate cancer after previous TUR
- No consensus about performing delayed RP after previous TUR or about optimal therapy (very few studies have quoted functional outcomes).

Management of Incidentally Detected Cancers after TURP

- T1a: Observation or active surveillance
- T1b:
  - High chance of residual prostate cancer
  - Increased risk of T2 or more cancers
  - Increased risk of biochemical relapse if untreated
  - Active treatment recommended especially in intermediate and high risk patients
  - Radical prostatectomy versus radiation therapy.

Concerns about TURP Scenario

- Thickened bladder wall secondary to BOO: Difficulty in urethrovesical anastomosis
- Difficulty in identifying prostatourethral junction due to floppiness
- Risk of injury to ureteric orifices due to cicatrization and pulling near the bladder neck
- Increased periprostatic adhesions and inflammation
- Difficulty in identification and preservation of adequate residual urethral length due to fibrosis: Improper anastomosis and may influence long-term continence
- Increased need for bladder neck reconstruction, leading to leak and suboptimal continence
- Increased risk of rectal injury
- SV involvement due to spread via ejaculatory ducts in transitional zone tumor
- Increased risk of incontinence as TUR makes internal sphincter deficient and puts external sphincter at risk if proper technique not used
- Increased risk of stricture formation due to urethral manipulation and prolonged catheterization as well as due to leak
- Poor healing at urethrovesical anastomosis
- Increased risk of erectile dysfunction since NV bundle identification difficult
- Enlarged reactive LN makes interpretation of imaging difficult
- Increased risk of metastatic spread due to opening of LV channels during TUR along with continuous fluid irrigation.

Operative Issues and Complications

- Good surgical expertise and experience needed to make technical adjustments needed to manage unexpected difficulties and to ensure oncological radicality of surgery: Difficulty more with more radical TUR
- Most common areas of difficulty are prostatic apex and NV bundle due to severe inflammation and fibrosis secondary to fluid extravasation (NV bundle sparing possible in only 30–55%)
- Increased total operative time and blood loss
- Residual prostatic tissue not removed en-bloc in 30% patients
- Capsular violation in 25–28%
- Positive surgical margins in 25–30% in T2 lesions
- Increased need for bladder neck reconstruction
- Longer period of catheterization and hospital stay
- Increased risk of anastomotic leak and subsequent stricture formation: Increased risk of re-hospitalization
- RP can be performed safely after previous TUR.

Oncological and Functional Results

- Assurance of oncological radicality and safety: No difference in progression free survival (PFS) bet patients of RP with or without prior TURP
- Residual cancer in almost all patients (PSA before and after TUR and Gleason score only predictors of residual disease and survival)
- Acceptable intra- and postoperative morbidity
- Functional results poorer in terms of continence, return to continence and potency: H/O TURP independent risk factor for anastomotic stricture, erectile dysfunction and urinary incontinence after RP
- Consistent rate of severe intra- and postoperative morbidity coupled with decreased functional outcomes and poorer Pentafecta results
- Conclusions irrespective of approach (open, laparoscopic, robotic)
- Patients should be informed that the functional results are less predictable and less satisfactory than those achieved after RP for naïve patients
- Surgery should be within a month of TURP or after 4 months – preferably extraperitoneal approach
- Cystoscopy must prior to RP
- If aggressive TURP: Better to avoid RP and give external beam radiation therapy (EBRT).

CASE 2

Metastatic Prostate Cancer – Post-orchiectomy Patient in Urinary Retention Concerns and Precautions about TUR

- Channel TUR: Palliative procedure
- Should be done in highly selected patients – disease status, age, comorbidities, etc.

- Patients with gross invasion of bladder neck, ureteric involvement and extension to sphincteric region not suitable
- Anatomical landmarks unclear and obscured – may be worsened by irregular prostatic tissue
- Adequacy (not too little, not too much) of TUR depends on clinical judgment
- Technically more challenging: Needs experience
- Incontinence more common
- Regrowth of prostatic tissue possible if no other treatment given.

CASE 3

- Patient with localized prostate cancer.
- PSA 60 ng/mL.
- CT scan and bone scan negative.
- Patient in urinary retention with failed catheter trial.
- How will you manage his retention with TUR?
- In patients with PSA > 20 ng/mL, in a cohort with mostly clinically organ-confined tumors, treated with RP, Yassepovich found a PSA failure rate of 44% and 53% at 5 and 10 years, respectively.
- D'Amico et al. found that men with PSA levels > 20 ng/mL had a 50% risk of PSA failure at 5 years after RP.
- NAHT + EBRT + AHT is the alternative approach that is preferred for high risk localized prostate cancer.
- Decision also depends on Gleason score and clinical stage.
- In patients with urinary retention, BOO usually due to BPH and uncommonly due to CaP.
- In case RP contemplated, no need of a formal TUR prior to it.
- In case EBRT contemplated, α-blockers may be used in addition to NAHT. If urinary retention persists, TUR may be necessary prior to RT. Increased risk of stricture after TUR+RT.
- Weight of the prostate also an important issue.

CASE 4

Localized Prostate Cancer in a Patient Undergoing Transplant

- Current policy for patients with ESRD and PC recommends waiting 5 years after primary therapy before enrolment on the transplant waiting list
- Risk of dying during 5 years of dialysis is approx 59%, while risk of PC recurrence is much lower
- Nomograms can accurately predict the risk of PC recurrence
- Time that a patient must wait for a transplant should be based on this individualized risk assessment rather than a general rule (*Secin et al. MSKCC. 2004*).

Treatment of Prostate Cancer in Renal Transplant Recipient Patients

- Cumulative incidence of prostate cancer in patients with transplant 3.1% at 3 years

- Natural history in presence of immunosuppression uncertain: probably increased growth rate and metastatic potential
- Treatment decision based on PSA, clinical stage and Gleason score
- Observation not an ideal option except in very select patients with advanced age and severe comorbidities
- Both RP and RT found to be safe and effective in patients with ESRD or transplant: Proper precautions essential
- Good short-term results reported after RP.

Radical Prostatectomy in Patients with Renal Transplant

- RP has been found to be safe by all 3 approaches: Infection and delayed wound healing remain a concern
- No increased morbidity or graft function impairment
- Ipsilateral (on the same side as transplant) lymphadenectomy is usually avoided
- No problems in bladder descent or vesicourethral anastomosis
- PSA reliable marker for monitoring
- M-TOR inhibitor sirolimus being tried in post-transplant setting.

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35

Coexisting Benign Enlargement of Prostate and Transitional Cell Carcinoma of Bladder

• RM Meyyappan

INTRODUCTION

- Transitional Cell Carcinoma (TCC) is fourth common cancer in men in West
- 75–85% are non-muscle invasive
- Standard management – Transurethral resection of bladder tumor (TURBT)
- BPH is most common condition associated with aging in men
- Its usual to have a patient with these two conditions coexisting.

TRANSITIONAL CELL CARCINOMA OF BLADDER

- About 50–70% recurrence
- About 10% progression
- Implantation of tumor cells (*Albarran and Imbert, 1903*)
- TURP provides raw area, highly susceptible to tumor implantation and recurrence.

Diagnosis of TCC in Patients with BPH

- Presence of hematuria may give a clue
- Presence of Irritative symptoms
- Highly nonspecific
- USG may identify the lesion.

Earlier Studies

- Simultaneous TURBT + TURP
- Kiefer and Hinman (1956)–100% recurrence
- Golomb et al (1989)–25% recurrence

Risk Factors for Recurrence

- Multiple tumors
- Recurrent tumors
- Presence of CIS
- Large tumors (>3 cm)
- High stage (T1)
- High grade (G3).

Surgery for BPE

- Moderate to severe symptoms
- Failure of medical management
- Urinary retention
- Recurrent hematuria
- Recurrent UTI
- Complications like stone, bladder diverticula, upper tract changes, raised renal parameters.

TURBT AND TURP *(Old Concept-Albarran)*

- Tumor cell implantation in raw areas created by the TURP
- Increased incidence of bladder neck and prostatic fossa recurrence
- Reduced time for recurrence.

Recent Meta-analysis

- Meta analysis of six studies (One prospective and 5 retrospective).

Table 35.1: Recurrence

	Simultaneous		*Control*		*Odds ratio*	
Study or Subgroup	*Events*	*Total*	*Events*	*Total*	*Weight*	*M-H, Fixed, 95% CI*
Ham WS 2009	0	106	0	107	—	Not estimable
Jaidane 2009	1	85	1	85	2.8%	1.00 [0.06, 16.25]
Laor 1981	21	137	27	150	61.9%	0.82 [0.44, 1.54]
Singh 2009	4	24	3	24	7.1%	1.40 [0.28, 7.06]
Ugurlu 2007	1	31	1	34	2.6%	1.10 [0.07, 18.37]
Vicente 1988	10	100	10	100	25.5%	1.00 [0.40, 2.52]
Total (95% CI)		483		500	100.0%	0.92 [0.57, 1.49]
Total events	37		42			
Heterogeneity: $Chi^2 = 0.43$, df = 4 (P = 0.98); $I^2 = 0\%$						
Test for overall effect: Z = 0.33 (P = 0.74)						

Recurrence

- 7.7% of patients in combined TURBT/TURP group and 8.4% in TURBT alone group developed recurrence in bladder neck/prostatic fossa

- No statistically significant difference
- In fact, recurrence lesser in study group
- Resolved BOO, less PVR may have decreased dwell time of carcinogens in bladder – reduced recurrence rates.

	Patients (n)	*Total recurrence, %*	*Recurrent in prostatic fossa %*	*Progression %*	*Mean follow-up (mo)*	*Elapsed time to recurrence (mo)*
Simultaneous group						
Laor 1981	137	77	21	NA	69	NA
Vicentle 1988	100	55	10	NA	47	14
Ugurlu 2007	31	11	1	3	30.6	20.2
Singh 2009	24	12	4	3	35.7	7.33
Ham 2009	106	31	0	10	50.1	NA
Jaidane 2009	85	17	1	2	35.2	NA
Total	483	203	37	18		
Control Group						
Laor 1981	150	92	27	NA	96	NA
Vicente 1988	100	73	10	NA	46	16
Ugurlu 2007	34	14	1	3	27.4	13.7
Singh 2009	24	11	3	2	37.6	7.0
Ham 2009	107	46	0	12	54.3	NA
Jaidane 2009	85	20	1	2	33.1	NA
Total	500	256	42	19		

Source: Ham WS, Kim WT, Jeon HJ, et al. Long-term outcome of simultaneous transurethral resection of bladder tumor and prostate in patients with nonmuscle invasive bladder and bladder outlet obstruction. J Urol. 2009;181:1594–9.

Time of Recurrence

- No statistically significant difference between the two groups
- Ham et al: 60 months recurrence free probability. 52% in study group vs 43.4% in TURBT only group
- The time to recurrence was significantly longer after simultaneous TURBT and TURP ($p = 0.021$).

Muscle Invasive TCC

- Radical cystoprostatectomy with urinary diversion is the treatment of choice.

Perforation during TURBT

- Identified on table – Reduced returns of irrigation fluid, increasing abdominal distension, diaphragmatic irritation
- Open repair
- No substantial increase in extravesical tumor seeding.

Intravesical BCG

- TURP exposes raw surface
- Re-epithelialization of prostatic mucosa
- From adjoining epithelia
- Squamous metaplasia
- Complete re-epithelialization and wound sealing – 12 weeks
- BCG after 12 weeks?

TURBT with TURP

- Concept of tumor cell implantation (old)
- Simultaneous TURP may treat outlet obstruction, reduce post-void residual, hence reduce dwell time of carcinogens in bladder—theoretically reducing recurrence rates
- Studies found no increase in bladder neck/prostatic fossa recurrences after simultaneous surgeries.

CONCLUSION

- TURP can be safely combined with TURBT in management of patients requiring surgery for both these conditions
- No increase in recurrence rates demonstrated.

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36

Parkinson's Disease and Benign Enlargement of the Prostate

• Vishwanber Nath

BENIGN PROSTATIC HYPERPLASIA AND PARKINSONISM

- What is the controversy?
- Can TURP worsen storage LUTS and cause de novo incontinence in patients with PD?
- Is TURP ever advisable in patients with PD?

PD and LUTS

- About 30–40% prevalence of LUTS in patients with PD
- Nocturia (86%), frequency (71%), urgency (68%) and urge incontinence (40%)
- UDS usually shows DO with good bladder emptying
- BOO uncommon in PD
- Effect of anti-PD medication on LUTS is unpredictable

The origin of the controversy

- 20% chance of de novo incontinence after TURP in patients with PD
- However, review of above study showed that patients who developed incontinence had MSA, not PD
- MSA can be very difficult to distinguish from PD
  - 50% MSA misdiagnosed as PD

Controversy – the Opposite View

- TURP successful in 70% patients with PD
  - Risk of de novo incontinence minimal
- 23 patients with PD; TURP for retention/refractory LUTS
  - Reviewed retrospectively
  - 'Genuine PD' identified by excluding all those whose post-TURP neurological course suggested MSA
- Among 23 patients, 16 voiding well without incontinence at 3 year follow-up
- Continence restored (5/10) and improved (3/10) out of 10 patients with preoperative urge urinary incontinence (UUI)

So, what does the evidence suggest:

- LUTS in PD patients are predominantly due to DO
  - However, some patients can have genuine BOO also
- MSA can be very difficult to distinguish from PD
  - Sphincter EMG may help
- MSA patients have much poorer outcome from TURP
- Even among patients with 'genuine PD' there is
  - 30% chance of failure of TURP
- TURP should only be considered after very careful UDS based diagnosis of BOO – and after counseling patient about 30% chance of failure.

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37

Bladder Diverticulum and Benign Enlargement of the Prostate

• Jayesh Dhabalia

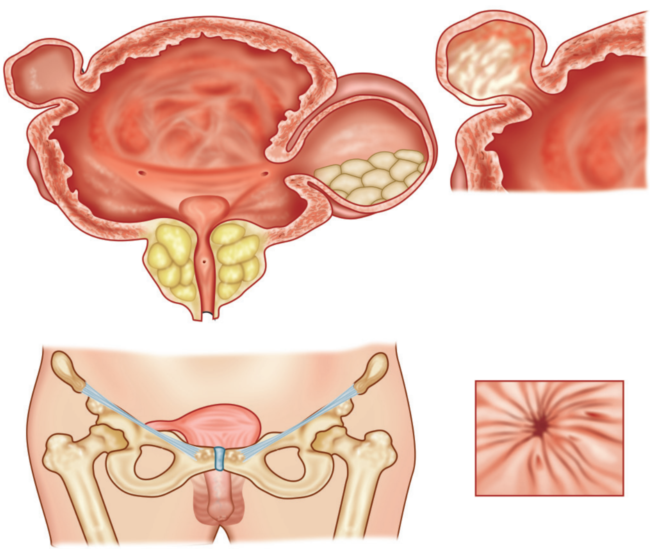


Figure 37.1: Benign enlargement of the prostate with bladder diverticulum

INTRODUCTION

- Incidence
  - About 1–6%.............. Up to 40%.
  - ↑ with age.
- Secondary to obstruction.
- Morphology
  - Multiple small ± one or few large
  - Trabeculations and sacculations
  - Posterolateral to ureteric orifice, anywhere except base
  - May not correlate with degree of obstruction

- Rarely—Single
  - Without trabeculations and sacculations
  - Pre-existing
    - Congenital
    - Iatrogenic
    - Catheter induced.
- Associated conditions
  - Malignancy
  - Stone/s
  - Involvement of ureter.
- BOO (BEP) with diverticulum
  - UTI - ↑ 4 to 7 times
  - ARU - ↑ 2 to 4 times
  - ↓ bladder capacity.
- Pathophysiology
  - Bladder outlet obstruction—high intravesical pressure
  - Herniation of bladder endothelium through the muscularis propria of the bladder.
- Large diverticulum—Safeguard against deterioration of rest of the bladder.
- Histologically
  - Acquired diverticular wall
    - Mucosa
    - Lamina propria
  - No/very few scattered thin muscle fibers
  - Adventitial layer
  - Fibrous pseudocapsule – recurrent infection/inflammation
- Squamous metaplasia – up to 80%.

CLINICAL PRESENTATION

- Nonspecific
- Due to
  - Stasis of urine
  - Mass effect
  - Incidental
  - Others.
- Stasis of urine—poor/incomplete emptying
  - Sense of incomplete voiding
  - Double voiding
  - UTI
    - Recurrent
    - Difficult to eradicate
- Mass effect—in lower abdomen and pelvis
  - Lower abdominal fullness/mass
  - Lower ureteric obstruction
  - Bladder outlet obstruction
- Incidental

- Others
  - Hematuria – infection/malignancy
  - Content of inguinal hernia
  - Secondary stone/s.

MANAGEMENT

- Important determinants of presentation and treatment
  - Diverticular morphology
    - Size and location – significant size, >5 cm
    - Neck – size and location
- Determines extent of diverticular emptying
- Degree of BOO – accentuates effects
- Associated conditions
  - Malignancy
  - Stone/s
  - Ureteral involvement.

INVESTIGATIONS

- Diagnosis – Incidental
- Specific investigations
  - Degree of BOO
  - Need of treatment for diverticulum
    - Diverticulum morphology
    - Associated conditions
    - Mass effect
- USG
  - Often 1st investigation, underutilized
  - Prostate evaluation
  - Diverticular morphology
  - Upper tracts

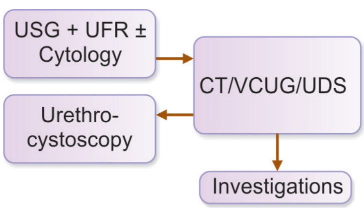


Figure 37.2: Investigations of disease

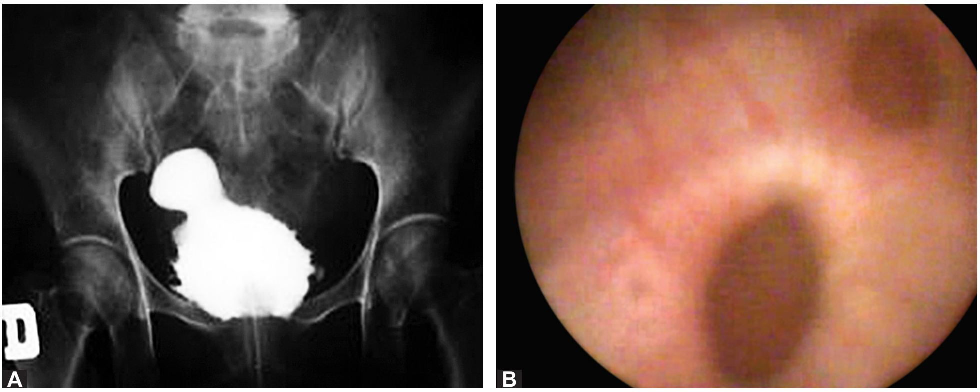
Abbreviations: CT, computed tomography; UDS, urodynamics; UFR, ultrafiltration rate; USG, ultrasonography; VCUG, voiding cystourethrogram

  - Significance of diverticulum/need of treatment
  - Pre and post-void bladder volume
- CT
  - Large diverticulum: Relation to surrounding structures
  - Associated conditions
    Malignancy
    Stone/s
  - Narrow/Obstructed neck – paravesical cyst/mass on USG.
- VCUG
  - Rarely required – to evaluate vesicoureteric reflux.
- UDS
  - Less often needed
    - ↓ detrusor contractility
    - Low or insignificant obstruction.
- Endoscopy
  - Diagnostic or confirmation
  - Pathophysiological siginificance of diverticulum.
- Urine cytology
  - All patients must in
    - Hematuria
    - Malignancy
    - Stone/s.
- Flexible cystoscopy—complementary
- CT –Virtual endoscopy – complementary, follow-up.

Management

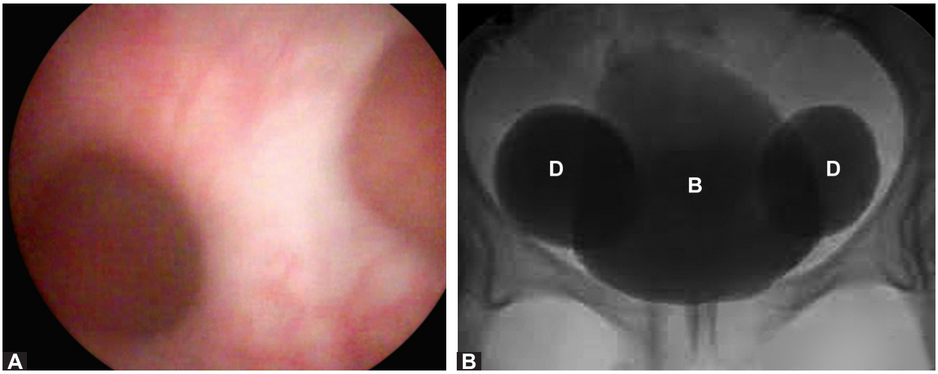
- Diverticular morphology
- Favorable parameters
- Insignificant residual urine
- Small diverticulum
  - Diverticular neck – large size and dependent position
- Intermediate/indeterminate parameters
  - Moderate residual urine, further improvement after treatment of BOO
  - Moderate size ≤ 5 cm
  - Diverticular neck—moderate size -
    Around center of diverticulum
  - Location : lateral walls
- Unfavorable parameters
  - Large size ≥ 5 cm
  - Diverticular neck—stenosed/obliterated—Cephalad position
  - Location—posterior wall, near base.

No treatment



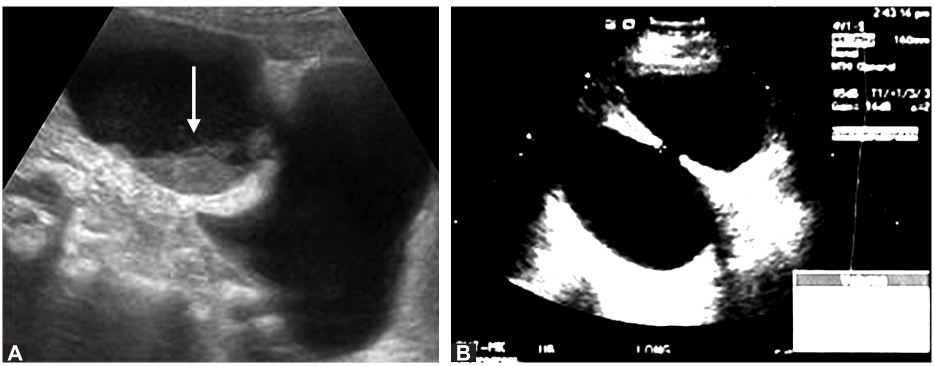
Figures 37.3A and B: Small diverticulum

Indeterminate

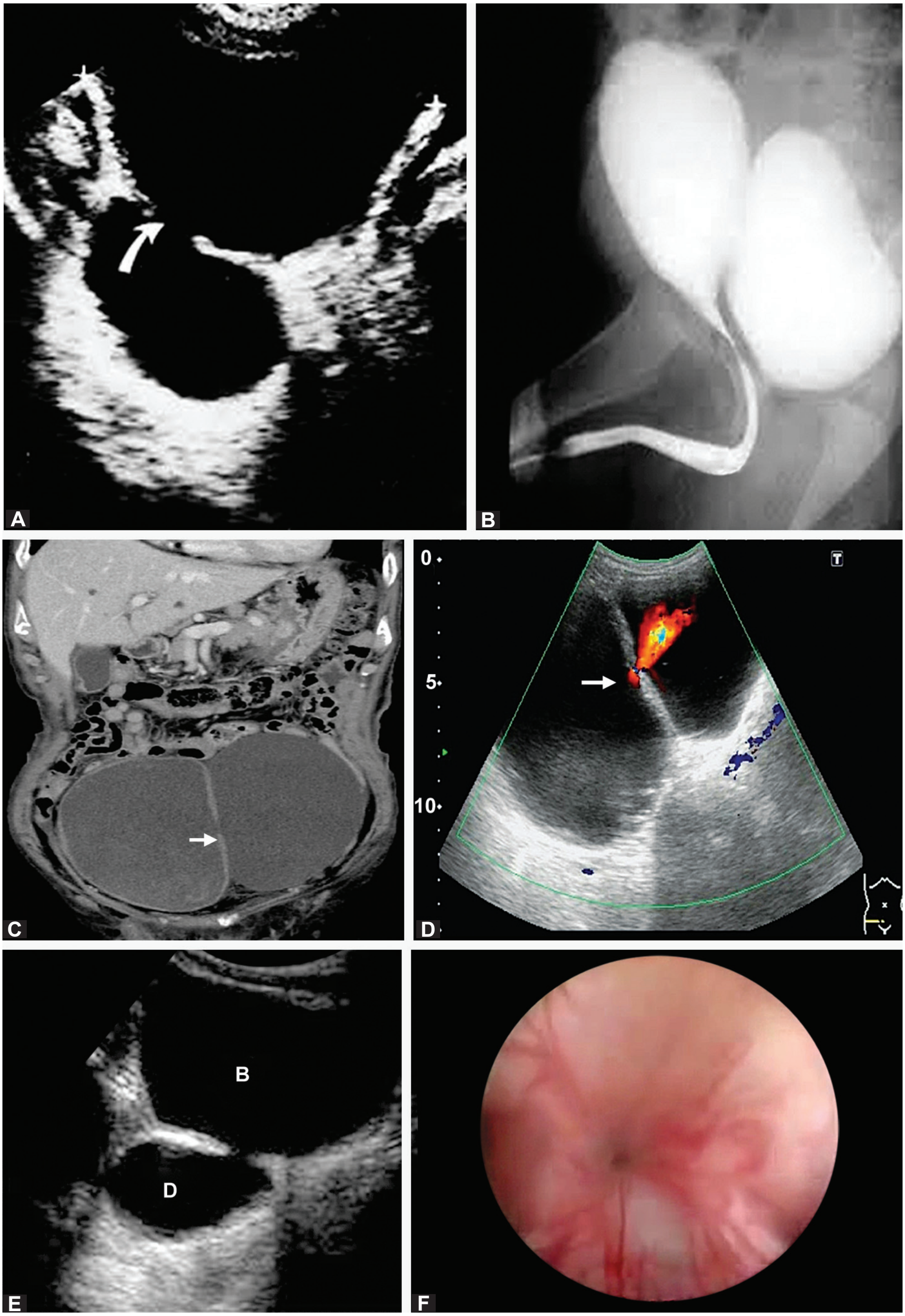


Figures 37.4A and B: Moderate diverticulum

Requiring treatment



Figures 37.5A and B: Ultrasonography of large diverticulum



Figures 37.6A to F: Various modalities for demonstrating diverticulum

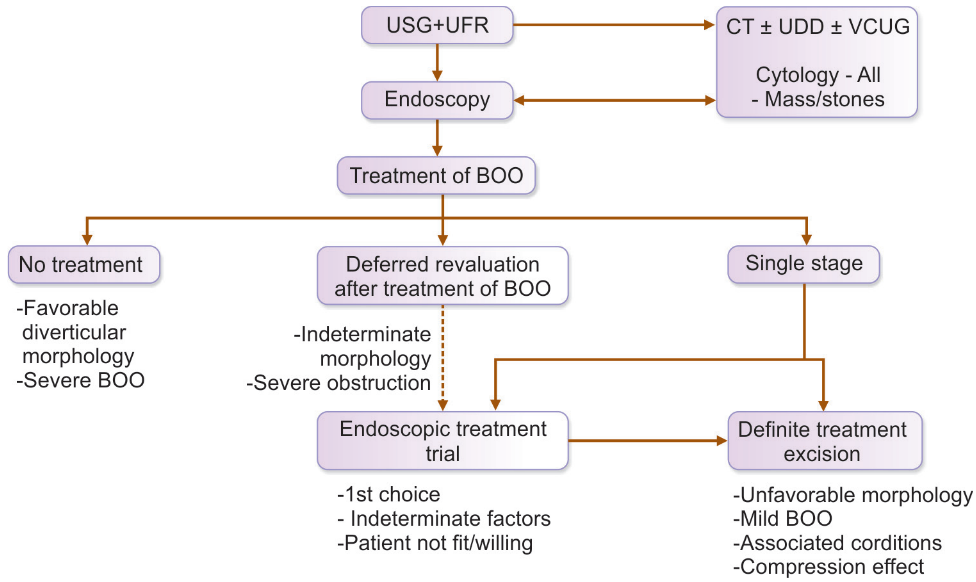


Figure 37.7: Management of disease

ENDOSCOPIC TREATMENT

- Diverticular neck
  - 5 and 7 o'clock Incision
  - Partial resection (between 4 to 8 o'clock)
  - Complete resection
- Diverticular mucosa—fulguration
- Neck treatment alone vs diverticulum fulguration + treatment of neck
- Underutilized
- Reported experience
  - Number : 300 patients
  - Diverticular size : 3–7 cm, 20–950 mL
  - Diverticular position : not specified
  - Diverticular neck size : 0.3–2 cm/not specified
  - Diverticular neck position : not specified
  - Success rate : 40–80%
  - Disappearance : 15–80%
  - Significant size reduction : (> 50%)
  - Failure rate : 20–55%
  - Late recurrence – insignificant size/stasis
  - Complication rate : 10-20% (all minor, insignificant morbidity)

- hemorrhage
- Febrile UTI
- No significant perforation reported.

Management

- Excision/Radical treatment
  - Open/laparoscopic
    - Similar results
    - Surgeon choice
  - Extravesical
  - Intravesical + extravesical
  - Intravesical.
- Open
  - Often combined
    - Transvesical prostatectomy
    - Intravesical + extravesical diverticulectomy.
  - Extravesical – staged procedure.

Associated Conditions

- Stones—treatment of stones + diverticulum
- Reflux—high grade/recurrent UTI
  - excision with reimplantation
- Malignancy
  - Incidence : 1–8%
  - Histology : Predominantly TCC
    - Squamous, adenocarcinoma, carcinosarcoma, sarcoma
  - Prolonged stasis and infection
  - Stage jump : T1–T3, difficult staging
  - Cytology for all
  - Bladder biopsy.

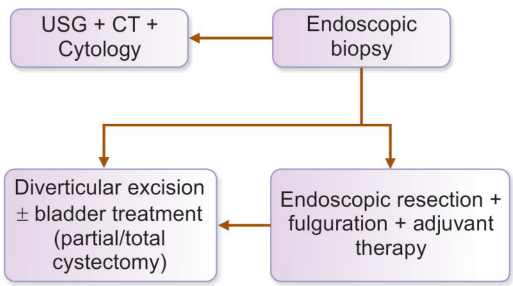


Figure 37.8: Protocol for management of malignancy in diverticulum

Associated Conditions—Transitional Cell Carcinoma (TCC)

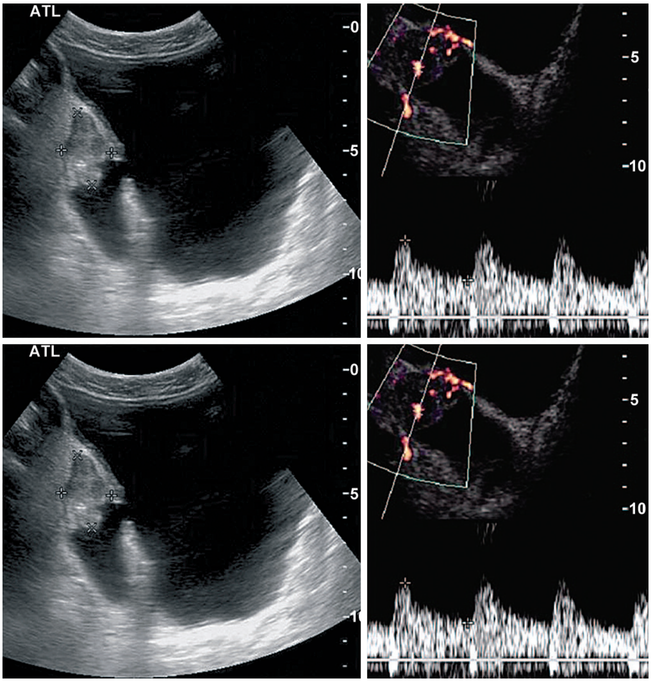


Figure 37.9: Associated condition with TCC

Associated Conditions—Stones

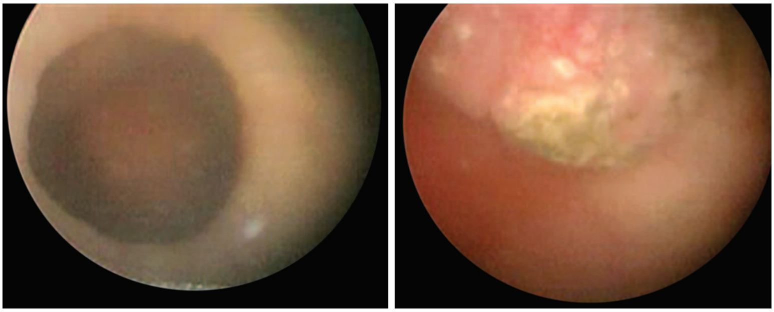


Figure 37.10: Associated conditions with stones

Associated Conditions—Ureteral Deviation

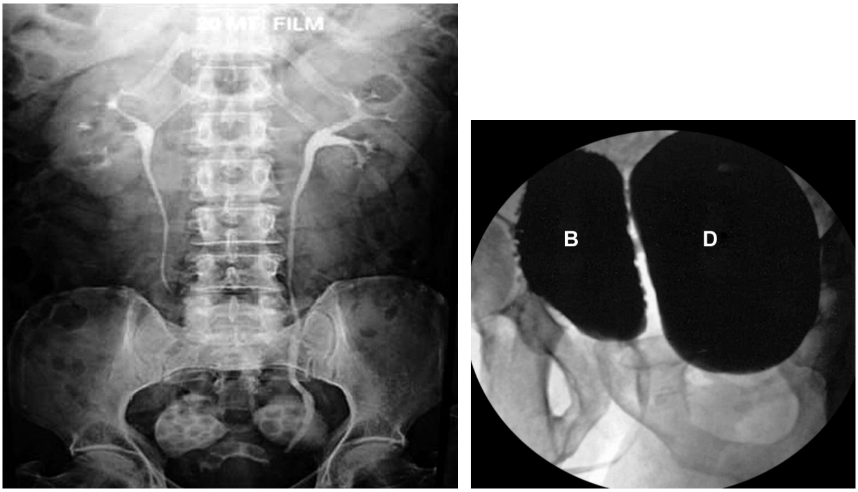


Figure 37.11: Associated conditions with ureteral deviation

Associated Conditions—Paraureteral Diverticulum

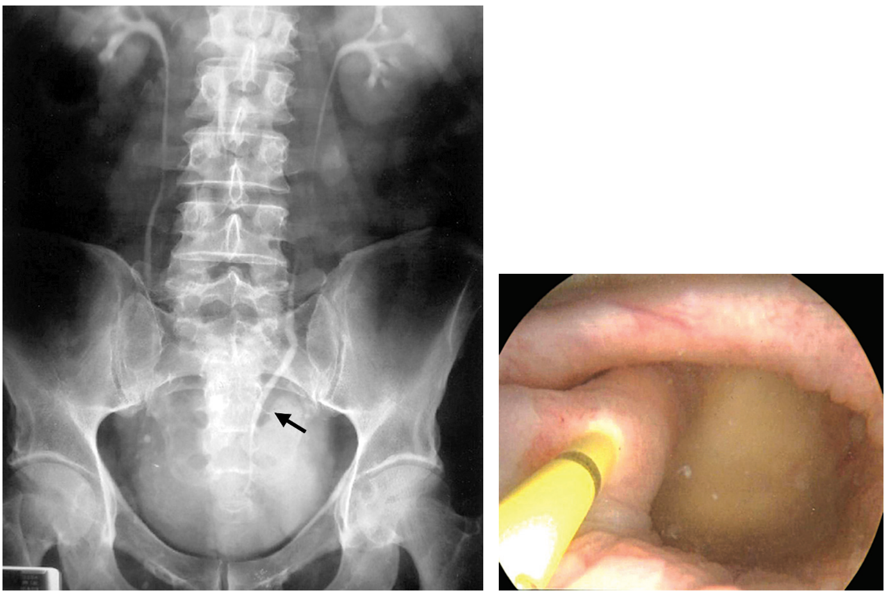


Figure 37.12: Associated conditions—paraureteral diverticulum

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38

Minimally Invasive Treatment of Benign Prostatic Hyperplasia

• Anant Kumar

BOTOX AND BPH

- A beautifying agent for sagging old age
- Prostate is no exception–getting large in old age
- So, why not give Botox sting to make him small and young
- Neurotoxin-induced denervation atrophy, induction of apoptosis (via blockage of ACh), inhibition of proliferation and down-regulation of α1A -adrenergic receptors
- Given transperineally, transrectally or transurethrally—in transitions zone and around 100 to 600 units.

Results—Systemic Review

- Five experimental and 10 clinical studies
- Prostate volume—20 to 80 gm
- 100 to 300 IU-TP,TU,TR
- FU-3 to 20 months
- All studies—Improvement in uroflow and symptom score
- Decrease in PV, PSA and PVR
- No side effects
- Patient-reported outcomes in LUTS due to BPH treated with intraprostatic Botox: 3-month results of a prospective single-armed cohort study;
- 64 men—-63 years mean age—200 IU,TR
- 49% reduction in symptoms score and 44% health related quality score
- 33% improvement in uroflow and 80% reduction in PVR
- 67% reported satisfaction and 84% will recommend to others.

Advantages

- Outdoor procedure and minimally invasive
- No side or adverse effect
- Decreases volume, PVR and symptoms score
- Improves flow

- Effect last up to 6 to 12 months
- Better than medical treatment and thermotherapy
- Can be repeated after one year
- Good in poor risk patients
- No retrograde ejaculation.

Disadvantages

- Expensive
- Short-term gain
- Not effective in acute retention
- Still evolving
- Not FDA approved
- Long-term multicentric prospective randomized studies required.

ETHANOL AND BPH

- Intoxicate the aging prostate
- Cell necrosis and apoptosis
- Given transurethrally, transperineally and transrectally under USG—distal to BN in both lobes
- Catheter required.

Results

- Evaluation of TEAP for symptomatic BPH: a European multi-center evaluation.
- EAU Urol 2004
- 115 patients, mean 46 gram of prostate, 14 mL ethanol and 12 months of follow-up
- 98% voided 4th day on catheter removal
- 59% reduction in IPSPS and QOL score at 1 and 12th months
- 35% improvement in peak flow at 3rd and 12th months
- 16% reduction in prostate volume
- Irritative symptoms (26%), hematuria (16%)
- Bladder neck necrosis (2) requiring open surgery
- 7% required TURP in follow-up.

Advantages and Disadvantages

- Effective and minimally invasive
- Safe if delivered distal to bladder neck
- Serious adverse complications
- May be tried in inoperable patients
- Special delivery system and needle available
- Not popular and not FDA approved.

BPH AND THERMOTHERAPY

Cochrane System Review

- 15 studies with 1585 patients could meet criteria, prostate size 30 mL to 100 mL
- Comparison with TURP/Sham therapy/medical treatment
- Study duration—3 to 60 months
- Mean age 66.8 years with similar uroflow, prostate size and IPSS score.

Table 38.1: Cochrane system review—result

	MTh	TURP	Sham	Medical treatment
IPSS score	65%	77%		
Uroflow	70%	119%		
IPSS score	5. 1		Sham	
Uroflow	2.01		Sham	
IPSS score	4.20			Med
Uroflow	2.30			Med
No data on Prostate size, PSA, symptoms duration, long-term results, different machine is not available				

Microwave Thermotherapy

- Minimally invasive, moderately effective in medium size glands and reasonable option
- Not effective in retention
- Many machines and no meaning full comparison
- No retro ejaculation, no stricture, no adverse effect.

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39

Older and Newer Modalities of Treatment in Benign Prostatic Hyperplasia

• Joseph Thomas

PROSTATE STENTS

- 1980 Fabian
- Functioning detrusor—preserves luminal patency
- Alternative to an indwelling catheter in unfit patients
- Primary treatment option—without significant comorbidities.

Permanent or Temporary

Permanent—biocompatible—epithelialization—embedded
Temporary—biostable or biodegradable—do not epithelialize—short-term relief—temporarily unfit.

Operative Procedure

- Outpatient setting under local anesthesia
- Length prostatic urethra measured—stent length
- Lithotomy—tip of prostatic urethral segment in bladder.
- Not positioned inside external urethral sphincter (EUS)—stress urinary (SU) incontinence.
- Confirm positioning—abdominal USG/cystoscopy
- Removal of a temporary stent pulling the retrieval string/by using graspers endoscopic guidance.
- Difficult to remove permanent stents in cases of stent migration, stent encrustation or epithelial in-growth.

Efficacy

- Small case studies on a range of stents–low level of evidence for their use.
- Follow-up have observed a significant attrition rate.
- Only one RCT that has compared two versions of a blind-placement prostatic stent
- No studies comparing stents with sham or other treatment modalities.

Permanent Stents (UroLume Endourethral Prosthesis)

- Systematic review identified 20 case series—990 patients who received the UroLume stent.
- 10 Studies that reported symptom scores demonstrated improved symptoms after stent.
- The pooled data—84% of patients (148/176) regained the ability to void spontaneously, with the mean Qmax ranging from 8.8 to 20 mL/s.
- At 12 years of follow-up, the mean IPSS, Qmax and PVR were 10.82, 11.5 mL/s and 80 mL.

Non-epithelializing (Temporary) Prostatic Stent (Memokath)

- Systematic review of the efficacy of Memokath
- 14 case series with 839 patients
- Seven studies reporting symptom scores found that Memokath insertion was associated with a reduction of 11–19 points in the IPSS
- Qmax increase of 3 to 11 mL/s, although again the time of assessment was variable after placement.

Tolerability and Safety

- Misplacement, migration, poor tolerability, exacerbation of LUTS, and encrustation
- The main adverse events immediately following stent placement include perineal pain or irritative voiding symptoms in most patients
- The systematic review of the UroLume reported a
  - 16% failure rate (104/666) within 12 months
  - Stent misplacement or migration (37%)
  - Recurrent obstructive or irritative voiding symptoms (14%).
- The overall failure rate at 5 years was 27% (50/188 stents).

Recommendations

- Prostatic stents remain an alternative to transurethral catheterization for men who have (recurrent) urinary retention and are at high risk for surgery.
- Prostatic stents are an alternative to catheterization for men unfit for surgery
- Stents may have a role in the temporary relief of benign prostatic obstruction after minimally invasive treatment.

Transurethral Microwave Therapy (TUMT)

- Microwave radiation through antenna to deliver heat into the prostate. Tissue is destroyed by being heated at temperatures above cytotoxic thresholds (> 45°C) (coagulation necrosis).
- It is also thought that the heat generated by TUMT also causes apoptosis and denervation of α-receptors, thereby decreasing the smooth muscle tone of the prostatic urethra.
- Registered trademark of technomed medical systems.

- Main devices:
  - Prostatron™ device: (Urologix, Minneapolis, MN, USA), Targis™ (Urologix, Minneapolis, MN, USA)
  - CoreTherm™ (ProstaLund, Lund, Sweden)
  - TMx-2000™ (TherMatrx Inc, Northbrook, ILL, USA)
  - Most published data on thermotherapy has been on the Prostatron device.

Efficacy

Treatment is well tolerated, even though most patients experience perineal discomfort and urinary urgency

- Significantly less with TURP—Catheterization time, incidence of dysuria/urgency and urinary retention
- Significantly less for TUMT—Hospitalization, hematuria, clot retention, transfusions, TUR syndrome, and urethral strictures.

Recommendations

- Transurethral microwave therapy achieves symptom improvement comparable to TURP, but is associated with decreased morbidity and lower flow improvements.
  LE 1a GR A
- Durability is in favor of transurethral resection of the prostate with lower re-treatment rates compared to transurethral microwave therapy. LE 1a GR A.

TRANSURETHRAL NEEDLE ABLATION OF THE PROSTATE

History

The transurethral needle ablation of the prostate system was pioneered by Stu Edwards of California, USA. The device was the product for a startup company called Vidamed, which was founded by Stu D Edwards along with Ron G Lax, Hugh Sharky and Ingemar Lundquist.

Principle

Transurethral needle ablation of the prostate (TUNA) uses low-level radiofrequency (RF) energy that is delivered by needles into the prostate and that produces localized necrotic lesions in the hyperplastic tissue.

Indications

The patient most likely to benefit from TUNA would be one who had lateral lobe enlargement and a prostate of 60 gram or less. Larger glands can be treated, but more time has to be spent treating each 1 cm segment.

Contraindications

- Active urinary tract infection
- Neurogenic, decompensated, or atonic bladder
- Urethral strictures or muscle spasms that prevent insertion of the cartridge sheath

- Bleeding disorders
- Clinical or histological evidence of prostatic cancer or bladder cancer
- Prostate gland that is less than 34 mm or greater than 80 mm in transverse diameter
- Presence of any prosthetic device in a region that may interfere with the procedure
- Patients whose prostate has previously been treated with nonpharmacologic therapies
- Presence of cardiac pacemaker, implantable defibrillator, or malleable penile implants.

Delivery of Radiofrequency Energy

The TUNA system consists of a special catheter attached to a generator. At the end of the catheter are two adjustable needles that are withdrawn into two adjustable shields made from Teflon. The needles are advanced into the prostatic tissue and can be placed accurately into the required position. The RF power that is delivered is 2 to 15 W for 5 minutes per lesion. The temperature at the tip of the needle varies from 80° to 100°C. The urethral temperature is kept below 46°C, and the temperature in the lesion is sustained for the treatment period. The generator produces a monopolar RF signal of 490 kHz, which allows excellent penetration and uniform tissue distribution. The TUNA system can create 1-cm necrotic lesions without difficulty in the prostate with no damage to rectum, bladder base, or distal prostatic urethra.The configuration of the needles within their protective sheath ensures that the treatment area is deep inside the prostatic lobes, and this ensures that the prostatic urethra is spared. Because there is a limited number of nerve endings in the prostatic glandular tissue and because the higher concentration of nerve endings immediately underlying the urethral epithelium remains undisturbed, topical anesthesia can be used with the patient experiencing only moderate discomfort. In addition, postprocedural irritative urinary symptoms are kept to a minimum.

Note: There is a difference in the method of tissue heating brought about by RF and microwave application. Microwaves treat a broad area and can penetrate tissue more deeply than RF. The central temperature is therefore lower than with RF in order to maintain safe heat levels at the treatment rim. Therefore, treatment with microwaves takes longer than RF to produce coagulative necrosis. RF, however, has a much hotter central area with a very quick decline in temperature as the distance increases from the treatment needle. This results in faster generation of the necrotic lesion but of a smaller area.

Adverse Effects

By far the most common complication reported, however, is post-treatment urinary retention. The second most common adverse event reported is that of irritative voiding symptoms. Other rare complications include UTIs, urethral strictures hematuria.

CURRENT SCENARIO

The most up-to-date version of the TUNA catheter is called the Pro-Vu system, and part of this device is reusable, unlike previous models. With the new modifications, the TUNA catheter is advanced under vision with the 0-degree fiberoptic telescope, which also allows the urologist to see the needles being advanced accurately into the prostate. The exact position within the prostate of the needle tip can be visualized by transrectal ultrasonography.

All major guidelines in the management of lower urinary tract symptoms in patients with benign prostatic enlargement include transurethral needle ablation of the prostate as a valuable treatment option in patients with severe symptoms and low degree of bladder outlet obstruction, patients at high risk for surgery and patients who wish to avoid surgery or regional/general anesthesia. The evidence currently available confirms a clinically relevant improvement of lower urinary tract symptoms and quality of life. Impact on voiding dynamics including flow rates, detrusor pressure at maximum flow and post-void residual, as well on prostate volume, remains marginal.

The long-term efficacy of the treatment has not been clearly evaluated, with no large series of patients having long-term follow-up.

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Important Studies and Drug Trials in Benign Prostatic Hyperplasia

• Rajeev Kumar • Ganesh Gopalakrishnan

SURGERY OUTCOMES

TURP: 1998[1]

- 13 participants (centers)
- Last 300 cases each
- Resection time: 57 minutes
- Resected weight: 22 grams
- 0.23% mortality
- 6.9% intraoperative complications
  - 2.5% transfusions
  - 2% TUR syndrome
- 18% postoperative complications
  - 6.5% failure to void
  - 3.9% transfusions
- Complications higher if gland > 45 grams

TURP: 2008[2]

- 44 non-academic, real world centers
- All patients from 2002–2003 (no selection)
- Prostate volume: 44 ± 25 minutes
- Resection time: 52 ± 26 minutes
- Resected weight: 28 ± 20 grams
- 0.1% mortality
- 11% morbidity
  - 2.9% transfusions
  - 1.4% TUR syndrome

- Morbidity/mortality increase if gland > 60 grams
- Men on catheter: 12% fail to void.

TURP: Today, it is not that bad!

Table 40.1: Comparative study of TURP

	Mebust, 1989	*Reich, 2008*	*Mayer, 2012*
Study	Retrospective	Prospective	Meta-analysis
Cases	3885	10654	3470
OR time (mins)	57	52	38
Resected weight (g)	22	28	26
Mortality	0.23%	0.1%	—
Transfusions	6.4%	2.9%	4.4%
Morbidity	18%	11%	—

ALPHA BLOCKER MONOTHERAPY

HYCAT[3]

- Selective α blockers: initial study
- 2084 men, 156 centers
- Terazosin (2–10 mg) versus placebo RCT
- AUA-SS improvement: 37.8% vs 18.4%
- PFS increase 2.2 mL/s vs 0.8 mL/s
- Withdrawal from the study 20% vs 15%
- Established role of terazosin.

ALFUS[4]

- 536 subjects
- Alfuzosin 10/15 mg vs controls
- IPSS improvement: 3.4/3.6 vs 1.6
- Flow improvement: 0.9/1.7 vs 0.2
- AE: 52%/43% vs 43%
- 0.6% ejaculatory AE
- AE: Dizziness, headache.

5 ALPHA REDUCTASE INHIBITOR MONOTHERAPY

PLESS[5]

- Proscar long-term efficacy and safety study (PLESS)
- Largest clinical study on finasteride therapy for BPH
- Double-blind, placebo-controlled, multicenter RCT

- 3040 men: Finasteride (5 mg/day) vs placebo for 4 years for LUTS
- Two point greater IPSS reduction in finasteride vs placebo
- 32% reduction in prostate volume
- 57% risk reduction for AUR
- 55% risk reduction in need for BPH surgery
- Maximal benefit in men with prostate > 55 cc.

Dutasteride[6]

- 4325 men (2951 completed)
- BPH, LUTS: PFS < 15 mL/s, size > 30 cc
- 3 RCTs of 0.5 mg dutasteride vs placebo
- Prostate volume reduced by 25.7%
- IPSS improved by 4.5 points (21.4%) at 24 months
- PFS improved at 1 month
- Risk reduction for AUR: 57%
- Risk reduction for surgery: 48%.

COMBINATION THERAPY

VA Study[7]

- First RCT on combination therapy
- 1229 patients
- Four study arms
  - Placebo
  - Finasteride alone (5 mg)
  - Terazosin alone (10 mg)
  - Combination therapy
- Terazosin alone and combination therapy: significant improvements
- Combination therapy no more effective than terazosin alone
- Low prostate size in study (< 40 g).

Predict[8]

- RCT for combination therapy, 1095 men, 1 year
- Four arms:
  - Doxazosin alone (titrate 1–10 mg/day)
  - Finasteride alone (5 mg/day)
  - Combination of doxazosin and finasteride
  - Placebo
- Doxazosin alone, combination therapy: significant improvements
- Combination therapy no more effective than doxazosin alone
- Finasteride alone not significantly different from placebo
- DRE based gland size, mean <40 grams.

MTOPS[9]

- Double-blind trial RCT on 3047 men
- Four arms:
  - Doxazosin alone (titrate 1–10 mg/day)
  - Finasteride alone (5 mg/day)
  - Combination of doxazosin and finasteride
  - Placebo
- Evaluated overall clinical progression
  - 4-point American Urological Association Symptom Index (AUASI) increase
  - AUR, incontinence, renal insufficiency, recurrent urinary tract infection
- 4.5 years follow-up
- Disease progression
  - Doxazosin: 39% risk reduction
  - Finasteride: 34% risk reduction
  - Combination therapy: 66% risk reduction
- AUR or surgery risk
  - Reduced by combination or finasteride
  - None by doxazosin alone
- Combination therapy superior to both doxazosin and finasteride alone.

CombAT[10]

- Double-blind trial RCT on 4844 men
- PV>30mL; PSA>1.5ng/mL
- IPSS ≥ 12; Qmax 5–15
- Three arms:
  - Tamsulosin alone (0.4 mg)
  - Dutasteride alone (0.5 mg)
  - Combination
- 4 year, ITT analysis.
- For PV > 42 mL, combination reduces risk of AUR, surgery
- Applicable for select group as per IC.

PLESS AND MTOPS STUDY

• **Ganesh Gopalakrishnan**

PLESS STUDY (PROSCAR LONG-TERM EFFICACY AND SAFETY STUDY)

Aim: To evaluate the long-term effects of finasteride on the symptoms of benign prostatic hyperplasia and on the incidence of important outcomes related to it, including the development of acute urinary retention and the need for surgery.

- Randomized, double blind placebo controlled study.
- Study period : 1990-1992.
- 95 centers, 3040 patients.
- Two groups : one received 5 mg finasteride (brand name PROSCAR) and other received placebo daily.
- Followed every 4 months for 4 years.

Inclusion Criteria

- Men with benign prostatic hyperplasia diagnosed on the basis of moderate-to-severe symptoms of urinary obstruction (determined by means of a validated symptom-score questionnaire
- Decreased maximal urinary flow rates (15 mL per second with a voided volume of 150 mL or more)
- An enlarged prostate gland on digital rectal examination.
- Men with serum prostate-specific antigen concentrations of 4.0 to 9.9 ng per milliliter having negative results on a prostatic biopsy.

Exclusion Criteria

- Men who were receiving alpha-adrenergic antagonist drugs or antiandrogens
- Those with a history of chronic prostatitis, recurrent urinary tract infections
- Prostate or bladder cancer or surgery
- A serum prostate-specific antigen concentration of 10 ng per milliliter or more.

Conclusion

- Among men with symptoms of urinary obstruction and prostatic enlargement, treatment with finasteride reduced the 4-year risk of requiring surgery and of acute urinary retention.
- The benefit of finasteride was evident within four months after the initiation of treatment, and it continued throughout the 4-year study period.

MTOPS STUDY (THE MEDICAL THERAPY OF PROSTATIC SYMPTOMS)

Aim: To determine whether therapy with the alpha-blocker doxazosin or the 5 alpha-reductase inhibitor finasteride, alone or in combination, would delay or prevent clinical progression of benign prostatic hyperplasia.

- Randomized, double blind placebo controlled study.
- Study period:1993-1998
- 17 centers, 3047 patients.
- Four groups: received either placebo/4 or 8 mg doxazosin/ 5 mg finasteride/combination.
- Followed every 3 months for 4 years.

Inclusion Criteria

- Men at least 50 years of age who had an American Urological Association (AUA) symptom score of 8 to 35 (scores can range from 0 [no symptoms] to 35 [severe symptoms]) 20 during the pilot phase—the range was subsequently changed to 8 to 30 during the full-scale study to allow for a 4-point worsening.
- A maximal urinary flow rate between 4 and 15 mL per second, with a voided volume of at least 125 mL.

Exclusion Criteria

- Men who had undergone a prior medical or surgical intervention for benign prostatic hyperplasia
- Those with a blood pressure of less than 90/70 mm Hg while they were supine
- Those with a serum prostate-specific antigen (PSA) level of more than 10 ng per milliliter.

Conclusion

- Combination therapy with doxazosin and finasteride significantly reduced the risk of overall clinical progression of benign prostatic hyperplasia more than did either drug alone.
- Combination therapy and finasteride monotherapy reduced the long-term risk of acute urinary retention and the need for invasive therapy related to benign prostatic hyperplasia.
- Combination therapy resulted in a greater improvement in the AUA symptom score and the maximal urinary flow rate than did either drug alone.

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41A

Medical Management versus Early Surgery: Debate

• Hemant Pathak

- A 58-year-old male
- AUA score—25/35
- UFR—12 mL/s
- Happy with alpha blockers
- 100 km away from city.

Each treatment option may improve symptoms.

Different treatment methods have their risks of complications, durability and chances of success.

Information Provided

The Patient

- He is young and without comorbidities.
- Presently fit to undergo surgery with good outcomes.

IPSS score—25/35.

- He could be having predominantly voiding symptoms like (IPSS) and no storage symptoms.

UFR—12 mL/s

- Sonography could show a large median lobe and significant post-void residue.
- Prostate size—moderate/large
- Medical treatment—effective

Patient is happy with medical treatment now but, would be prone for long-term complications

1. AUR
2. Increased post-void residue
3. UTI
4. Renal insufficiency.

Our patient has IPSS score of 25/35.

In different trials, all treatment regimens significantly improved symptom score. Placebo by 4 points, doxazocin by 6, finasteride by 5 and combination by 7 points.

Qmax improved by 1.4 mL/sec in placebo arm, 2.5 mL/s in doxazocin, 2.2 mL/s in finasteride and 3.7 mL/s in combination.

Discussion

- Surgery is performed in severe BPH or when patients choose surgery in the expectation of improving their quality of life.
- The factors determining treatment strategies are patient age, BPH severity, prostatic volume, patients' wishes, PSA results and post-void residual.

Typical Questions of Patients

- Will the treatment relieve all my symptoms?
- Are the benefits of the treatment long-lasting?
- What are the side effects and typical complications?
- Can the treatment be done as an outpatient, or will it require a hospital stay?
- Is the treatment a single event or will I need several treatments?
- Is the treatment painful?
- Will I need to take time off from work to recover?

TURP—Results Statistics

- IPSS score improved from 23.3 to 8.3 (15.0 symptom units)

Table 41A.1: Overview of treatment options

	Oral drugs	*Minimally invasive therapies*	*Transurethral resection of the prostate (surgery)*
Efficacy in symptoms relief	Mediam	Good	Good
Efficacy in obstruction relief	Poor	Good	Very Good
Overall complications rate	Low	Low	High
Catheterization needs	None	Low	High
Sexual adverse events	Low and reversible	Low	High
Duration of treatment	From months to years	Single-event	Single-event
Anesthesia needed	None	Local/General	Spinal/General
Long-term durability	Reversible when stopped	Good	Single-event

- Peak urinary flow rate improved from 8.4 to 20.8 mL/sec (12.4 mL/sec)
- At 3 years,
  - IPSS had decreased from 24.1 to 10.1
  - Qmax had improved from 8.8 to 19.1
- All the guidelines agreed in recommending surgical treatment for patients with complicated LUTS, such as those with,
  - Refractory urinary retention who had failed at least one trial of catheter removal,
  - Renal insufficiency,
  - Recurrent urinary tract infections,
- Persistent gross hematuria, or
- Bladder stones due to BOO and refractory to other therapies.

Other candidates for surgery are the patients who

- Refuse medical therapy or
- Achieve unsatisfactory benefit or
- Have unacceptable side effects following drug therapies.

All guidelines agreed in considering TURP as the gold standard of treatment, excluding cases with small prostate, suitable for TUIP, or very large glands, suitable for open prostatectomy.

- Now surgery is safe with bipolar
- Laser-HoLEP, green light KTP, Thulium
- No TUR syndrome
- Less bleeding
- Larger glands.

Side Effects of Medications

- Alpha blockers—Postural hypotension fell down; got fracture
- 5ARI—Decreased libido and ED
- One month cost = ₹ 540.00 and how long?
- Added to the existing medications for DM, HT, etc…

I am not recommending surgery to a patient with predominantly storage symptoms.

Surgery when indicated in appropriate case, definitely has a superior and lasting outcome.

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41B

Medical Treatment versus Early Surgery BPH: Debate

• Anita Patel

CASE SCENARIO

What is given

- A 60-year-old male
- IPSS score of 28 /35
- He is happy with medical management
- He stays 100 km away from any medical help.

What is not given

- What type of symptoms? Does he have storage or voiding symptoms or both? Is nocturia one of his concern? Is the IPSS before starting the treatment?
- What medication? Is he already on it or happy with the thought of taking tablets? In fact, may be he loaths the thought of surgery?
- What does his urine report show? What are the findings on post-void sonography? Is there any endovesical middle lobe?
- Is he sexually active?

My Approach will be

I will first counsel him about the nature of his disease, explain the cause of his symptoms and that it is not a malignancy. I will discuss various treatment options with him. Presumably the IPSS is before starting any medication. Watchful waiting (WW) is not option here as he is severely symptomatic and is seeking help.

Approximately, 85% of men will be stable on WW at 1 year, deteriorating progressively to 65% at 5 years. The reason why some men deteriorate with WW and others do not is not well understood; increasing symptom bother and PVR volumes appeared to be the strongest predictors of failure.

All guidelines make a Grade A recommendation with 1b level of evidence for WW in mild symptoms only.

In case the patient is already on some alpha blockers

If he is already on some treatment and if it is alpha blocker [most likely], what matters is the present score and which alpha blockers. Indirect comparisons between alpha 1-blockers, and limited direct comparisons, demonstrate that all alpha 1-blockers have a similar efficacy in appropriate doses. Thus there is no advantage in changing over to another. Also, there can be up to 50% improvement in IPSS with 40% improvement in UFR.

However, the type of alpha blocker will matter as a dose titration or increase is possible which is possible with Terazosin, Tamsulosin and Silodosin. I will watch carefully for any side effects, warn him about effects of alcohol with alpha blockers and will caution him about postural drop in BP especially during activities such as driving. If no treatment is given so far, Alfuzosin will be the ideal option with minimal possibility or retrograde ejaculation or rather an-ejaculation as per latest literature reports.

If nocturia is a symptom, routine lifestyle advice regarding fluid intake, etc. will be given.

If there is endovesical middle, with a prostate volume >25 mLs, I will add 5ARI, especially dutasteride.

Dutasteride seems to reduce IPSS, prostate volume, and the risk of acute urinary retention. It also increases Qmax even in patients with prostate volumes between 30 and 40 mL at baseline. It reduces disease progression as well as risk of retention and need for surgery.

The EAU guideline is 1b with Grade A recommendation for 5 ARI in moderate to severe symptoms.

However, let us assume he is sexually active, I will definitely discuss with him about PDE5 Inhibitor but will also tell him that PDE5 inhibitors though useful, are still at trial stage and are not openly recommended in a clinical setting. If he is willing for a trial, why not?

Combination therapy

For combination therapy in the MTOPS trial versus the CombAT trial, the following "reductions" were observed:

- Overall risk of disease progression was 66% versus 44%;
- Symptomatic progression, 64% vs 41%;
- Acute urinary retention, 81% vs 68%;
- Urinary incontinence, 65% vs 26%;
- BPH-related surgery, 67% vs 71%.

Further Counseling

I will also counsel him regarding avoiding certain medications such as OTC cough/cold remedies, antihistaminics, tricyclic antidepressants, etc. With the above advice, I am sure all his symptoms will improve. I will keep in reserve antimuscarinics as the chances of him requiring those are not very high.

The distance from medical help does not matter if he is well informed, intelligent and understands to importance of regular medical check-up and possible emergency mishaps. The first follow-up will be after 3 months to start with, the further plan will be decided later. However, the issue is how long can we continue medication? If he wishes to come off medication can he?

—Forever, if cost is not an issue. Also he can stop the 5 ARI treatment after 2 years or so and continue just the alpha blockers.

To Summarize

Surgical treatment is usually required when patients have experienced recurrent or refractory urinary retention, overflow incontinence, recurrent urinary tract infections, bladder stones or diverticula, treatment resistant macroscopic hematuria due to BPH/BPE, or dilatation of the upper urinary tract due to BPO, with or without renal insufficiency (absolute operation indications, need for surgery). Additionally, surgery is usually needed when patients have had insufficient relief in LUTS or PVR after conservative or medical treatments (relative operation indications).

My patient does not qualify for any of the above, so I will certainly give him the benefit of medical treatment but I will be very vigilant with close follow-up and offer him surgery if appropriate indication arises! I am sure and after meeting me, my patient will be sure that my advice is in his best interest!!!

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42A

TURP versus HoLEP

• Rajeev Kumar

DEBATE (BOE-CME: Mumbai 2012)

AGENDA

- Demonstrate TURP works
- Acknowledge limitations of TURP
- Acknowledge benefits of HoLEP.

ACCEPTED FACTS[1-3]

- TURP
- Routinely taught (more than HoLEP anyway!)
- Shorter learning curve
- Widely available equipment
- Lower cost.

TURP WORKS[4]

- 44 non-academic, real world centers
- All patients from 2002-2003 (no selection)
- Prostate volume: 44 ± 25 mL
- OR time: 52 ± 26 mins
- Resected weight: 28 ± 20 gram
- 0.1% mortality
- 11% morbidity
- 2.9% transfusions
- 1.4% TUR syndrome.

BIPOLAR TURP EVEN BETTER[5]

- Minimizes even these complications of TURP:
  - Lower TUR syndrome
  - Lower clot retention
  - Shorter irrigation and catheter times.

SO WHY HoLEP?

- Large glands
- Anticoagulated patients
- Shorter catheter time/hospitalization
- Stone also.

Gland Size?

- MTOPS:[6] Mean 37grams
- ALFUS:[7] Mean 38 grams
- Olmsted county:[8] Mean 27 grams.

More on Gland Size[9]

- 9,200 surgeries: 8,600 < 60 grams (94%).

Anticoagulation[10]

How many have it and must we continue?

Hospitalization

- Room rent: ₹ 5000/night (35@AIIMS)
- Laser machine: ₹ 1.5 crore
  - Annual interest: ₹ 15 Lakh
  - Per patient @ 500/year; 10 year life: ₹ 6000
- Fiber: ₹ 60,000
- Not having to learn the procedure: priceless.

Training for HoLEP

- AIIMS: No
- PGI: No
- SGPGI: No
- CMC: No
- KEM: No
- JIPMER: No
- Dr Anil Varshney: Yes, Yes, Yes.

THE BOTTOM-LINE

American Urological Association Guideline: Management of Benign Prostatic Hyperplasia (BPH)[11]

- "Transurethral resection is still the gold standard of interventional treatment"
- HoLEP
  - Results compare favorably… in the hands of an experienced surgeon
  - Long-term data beyond years are still lacking
  - Procedure requires specialized training and equipment
  - Learning curve appears to be greater than that of other technologies.

Canadian Urological Association Guideline[12]

Standard of care: Monopolar TURP for patients with bothersome LUTS.

European Association of Urology (EAU) Guideline[13]

- Standard treatment for small and moderate glands: TURP
- Lasers are alternative treatment options
- TURP comprises 95% of all surgical procedures in Europe (2006).

FINALLY

- The gold standard is:
  - Safe and effective (Oxymoron)
  - Cheap
  - Widely available
  - Regular part of training, easily learnt
  - Usable in 95% patients
- It is not perfect but HoLEP is hardly the solution!

EDITORIAL

- "As urologists, we need to continue to be cautious and circumspect before incorporating new therapies into our practices."[14]
- "HoLEP has been around for more than 13 years, but has not been embraced by mainstream urology beyond a select group of urologists worldwide."[15]

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42B

TURP versus Laser

• Anil Varshney

What a patient wants?

- Complete removal
- No blood transfusions
- No incision
- No scar
- One time solution
- Safety in high risk categories
- Short catheterization
- Short hospital stay
- No mortality/morbidity
- Preserve potency
- Economical
- Minimal re-operation rates.

EAU Guidelines – March 2011

Recommendation

	LE	*GR*
Monopolar TURP is the current surgical standard procedure for men with prostate sizes of 30-80 mL, BPO and moderate-to-severe LUTS. Monopolar TURP provides subjects and objective improvement rates superior to medical or minimally invasive treatments. However, the morbidity of monopolar TURP is higher than for TUIP, bipolar TURP, drugs, or other minimally-invasive procedures	1a	A
Bipolar TURP achieves short-term results comparable to monopolar TURP	1a	A
TUIP is the surgical therapy of choice for men with BPO, LUTS, and prostate sizes < 30 mL and without middle lobes.	1a	A

Abbreviations: BPO, benign prostatic obstruction; LUTS, lower urinary tract symptoms; TUIP, transurethral incision of the prostate; TURP, transurethral resection of the prostate

	LE	*GR*
Open prostatectomy is the first of surgical treatment in men with BPH-LUTS refractory to drugs, BPO, and prostate sizes > 80–100 mL in the absence of Holmium lasers.	1b	A
HoLEP and 532 nm laser vaporization of the prostate are minimally-invasive alternatives to TURP in men with BPE, BPO and LUTS, which lead to immediate, objective and subjective improvements comparable to TURP	1b	A
With regard to intraoperative safety, 532 nm lasar vaporization is superior to TURP and should be considered in patients receiving anticoagulant medication or with a high cardiovascular risk.	3	A
With regard to long-term complication rates, results are only available for HoLEP, and are comparable to TURP	1b	A

Abbreviations: BPE, benign prostatic enlargement; BPH, benign prostatic hyperplasia; BPO, benign prostate obstruction; HoLEP, holmium laser enucleation of the prostate; LUTS, lower urinary tract symptoms; TURP, transurethral resection of the prostate

Recommendations	*LE*	*GR*
HoLAP can be offered to patients with BOO or BPE with small to medium-sized prostates	1b	A
HoLRP can be offered to patients with BOO or BPE with small to medium-sized glands	1b	A
HoLEP can be offered to any patient with BOO or BPE	1b	A
HoLEP can be offered to patients in chronic urinary retention	2b	B
HoLEP can be offered to patients on anticoagulant or antiplatelet medication	2b	B

Abbreviations: BOO, bladder outlet obstruction; BPE, benign prostate enlargement, HoLAP, holmium laser ablation of the prostate; HoLEP, holmium laser enucleation to the prostate; HoLRP, holmium laser resection of the prostate.

TURP

- Larger the prostate

Larger the complications and lower success rates in TURP	67 grams	103 grams
Time of TURP	90 minutes	105 minutes
Postoperative complications	21%	25%
Redo TURP	9%	19%

TURP for BPH. How Large is too Large?

- TURP used for prostates > 80 mL, the cut off point set by EAU guidelines, because
  - Patients did not want open surgery
  - Conditions that make open surgery very difficult
  - Need for a quick discharge in an over crowded service
- The study concludes:
  - TURP should not be done by beginners or faint hearted for this group, needs experienced resectionist.
  - Larger prostates have higher incidence of urinary incontinence and strictures.
  - TURP need to be staged in select categories.

Bipolar TURP

- Recently being considered for large glands.
- Bipolar energy is used to resect the prostate under normal saline.
- Prostate is a highly vascular organ and is removed piecemeal thereby adding to operative time, bleeding and risk of leaving residual tissue in very large prostates.
- Risk of TUR syndrome is reduced but not completely eliminated.
- RCTs and long-term data is awaited.

MORBIDITY OF TURP—NOT ACCEPTABLE

- Bleeding (Need for transfusions)
- TURP syndrome
- Residual prostates
- Recurrence 5–15% at 10 years
- Morbidity increases with the size of the gland

New advances in benign prostatic hyperplasia—laser therapy.

- Laser therapy in all forms provides a better safety profile, lower rate of blood transfusion, and decreased length of catheterization and hospital stay, when compared to TURP or open prostatectomy.
- To date, HoLEP remains the most rigorously studied laser procedure and is superior to TURP and equivalent if not superior to open prostatectomy in terms of efficacy and long term durability with a reoperation rate for regrowth only 0.1%.

LASERS—COMFORT

A. Patient

- No hemodynamic disturbances
- Remains cheerful
- No painful traction
- Small sized catheter.

B. Surgeon

- No pressure to finish the procedure
- Can go for a disco/movie in the evening.

C. Anesthetist in 60–90 minutes, thus no sympathetic overactivity and its ill effects

- Sits in the side room and enjoys tea/coffee.

D. Nurses

- No blood transfusions
- Negligible nursing events.

What we look for in a Laser?

- Effective
- Durable
- Safe
- Versatile
- Economical.

HoLEP is more effective than TURP

- HoLEP vs TURP:
  - HoLEP is conceptually stronger than TURP
    a. Vessel first approach .
    b. Removing adenoma enbloc rather than cutting piece meal with vascular supply intact.

HoLEP—EFFECTIVENESS

- Tissue removed is greater with HoLEP than TURP and tissue for histopathology is not affected by thermal injury in HoLEP
- The prostate volume reduction is 77 to 92% (TURP—51 to 60%)
- Serum PSA reduction following HoLEP 88 to 94%
- Micturition improvement with HoLEP is better than that with TURP.
- Pressure flow data before and after reveal that HoLEP is Urodynamically superior at relieving out flow obstruction than TURP at a minimum follow up of 12 months.

RESULTS SUMMARIZED

- Any size of prostate can be treated
- No hemodynamic disturbances
- No incidence of TUR syndrome
- Excellent postoperative voiding parameters
- No complications especially attributable to laser
- Durable long-term results.

HoLEP is more Durable than TURP

- HoLEP—Durability
- HoLEP produces lasting improvement of micturition. A randomized trial comparing 100 HoLEP with 100 TURP patients at 3 year postoperatively, revealed HoLEP to provide significantly better relief of symptoms.
- HoLEP is superior to open prostatectomy in terms of hospital stay, catheterization time, blood loss and transfusion rates and equally effective at a follow-up of 18 months and 3 years.

HoLEP: Long-term durability of clinical outcomes and complication rates during 10 Years of follow-up

- HoLEP represents an effective treatment modality for men with symptomatic benign prostatic hyperplasia with a low rate of complications during a long follow-up. Patients who experience improvement from baseline to early follow-up maintain improvement at later follow-up.

Lasers are Safer than TURP

- HoLEP: Postoperative care
  - The mean catheter time 1.3 days.
  - Hospital stay 1.5 days.
  - 78% of the patients were discharged home within 24 hours after surgery.

- In a large series on >200 patients with an average enucleated tissue weight of 70 g, 90% of patients were discharged home on postoperative day 1 or earlier without a catheter.

Laser in High-risk Patients

- In men with high cardiovascular or pulmonary risk, receiving oral anticoagulant medication, or with bleeding disorders.
- In all patients, laser prostatectomy was performed successfully. No blood transfusions, no major complications, and there was no mortality.

Bleeding Disorders and Anticoagulants

- Proved to be adequate surgical therapy with less blood loss than TURP.
- Safe in high-risk patients with bleeding disorders.

Lasers are more versatile

Versatility

a. Size no limitation
b. Recurrent urinary retention—safe and effective
c. Chronic urinary retention—minimal incidence of failure to void
d. Safe in infected prostates
e. Safe in highly vascular and congested prostates
f. Safe in fully anticoagulated patients.

Holmium Laser is Economical

Cost: TURP Vs HoLEP

- Initial investment: High
- Recurrent per-patient cost: comparable
- Cost of TURP less than HoLEP
- In view of reduced hospital stay, costs become comparable
- Overall: Net cost saving to hospital
- Economy
- Type of practice
  – Primarily stones - 10–20 Watts
  – Prostate, stones and others - 50–100 Watts
- Cost of equipment (An average 100 cases per month)
  – Add ₹ 10,000 per case for laser - 10 Lacs per month
  – Cost recovery—7–8 months
  – Maintenance cost - ₹ 1000–2000 per patient

Limitations of HoLEP

- Learning curve
- 30 patients are required for a urologist familiar with transurethral surgery to feel reasonably safe performing HoLEP

- The learning curve for HoLEP is certainly shorter than that of laparoscopic procedures and TURP. For all urologists who manage to complete the learning curve, HoLEP has doubtless made TURP and open prostatectomy operations of the past.
- Need for anesthesia
- Stress incontinence (transient)
- Retrograde ejaculation.
- "Adoption of laser technology is associated with rising rates of surgical intervention for benign prostatic hyperplasia. This trend appears to be induced by Laser Surgery"
- Laser surgery is perceived to be minimally invasive, simple and safe by community at large.
- Patients are crossing regional borders to gain access to Laser technology. For example professor Kandaswami sent his physician from Coimbatore for Laser prostatectomy. I was summoned by a Urologist from Kolkata to do Laser Prostatectomy on him.
- In USA. Laser Surgery rates increased from 900 to 1100 procedures per 100,000/- from year 2000 to 2005 (J. Urol. 2008), because "Urologists are offering and patients are accepting more surgery after technology adoption".
- Reason: Introduction of laser prostatectomy may have increased the surgical capacity and therefore enabled urologists to satisfy previously unmet demand.
- Rebuttal
- "Do you Halal" a kidney or bladder, i.e remove it piecemeal, with vascular supply intact.
- Then why do it for prostate?

SUGGESTED READING

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43

Thulium Laser Prostatectomy versus Holmium

• Pankaj Maheshwari • Sujata K Patwardhan

Table 43.1: Comparison of thulium: YAG and holmium: YAG

Thulium	*Holmium: YAG*
Continuous wave	Pulsed laser
Quick vaporization of tissue	No vaporization
End fire and side fire delivery	Only end fire
Stone fragmentation not possible	Stone fragmentation possible
Clean cut	Traumatic effect, Rough Cut
Coagulates	Coagulates
Less than 400 micron penetration	Less than 400 micron penetration
Resection and enucleation	Resection and enucleation

Table 43.2: Comparison between various technique using thulium

	ThuLEP (70 watt)	*HoLEP (90 watt)*
n	71	62
Time (p = 0.034)	72.4 min	61.5 min
Blood loss	130 mL	166.6 mL
IPSS score dereased to	5.2	6.2
Quality of life score	1.3	1.2
PFR	23.4 mL/sec	24.2 mL/sec
PVR decreased by	82.50%	81.73%
Serum PSA decrease	43.36%	30.43%

CONCLUSION

- Both relieve lower urinary tract symptoms equally with high efficacy and safety.
- ThuLEP was statistically superior in terms of blood loss.
- Inferior to HoLEP in operation time.

Table 43.3: Clinical trails of holmium and thulium laser: comparison

Refe–rence	*Technique*	*Follow-up*	*Patients (n)*	*Mean prostate size (mL)*	*PSA reduc-tion (%)*	*Change in symp-toms (%)*	*Change in Qmax (mL/s) (%)*	*PVR change (%)*	*LE*
Mattioli et al 2009	ThuVAP ThuVARP	12	99 101	45	NA	-67*	14.8 (289)*	-88.9	4
Xia et al 2008	ThuVARP TURP	12	52 48	59.2 55.1	NA	-84 -81	15.7 (296) 15.8 (290)	-94.4 -92.8	1b
Fu et al 2009	ThuVARP TURP	12	58 42	49.8 48.2	NA	-85.4 -81.1	14.9 (329) 15.5 (312)	-84.3 -84.8	2b
Bach et al 2007 2009	ThuVARP	18	54	30.3	NA	-67	12.8 (258)	-86	2b
Fu et al 2008	ThuVARP	12	72	65.8	-69.4	-72.6	15.1 (364)	-65.7	2b
Szlauer at al 2009	ThuVARP	9	58	50.0	-56.1	-56	13.8 (270)	-62.4	2b
Shao et al 2009	ThuVEP HoLEP	6	52 46	40.3 37.3	-80 -80	-70 -60	14.9 (350) 15.5 (330)	-80 -80	1b
Bach et al 2009	ThuVEP	18	88	61.3	NA	-63	15.7 (664)	-72.4	2b

* for both groups

Abbreviations: HoLEP, Holmium laser enucleation of the prostate; PSA, Prostate specific antigen; PVR, postvoid residual; ThuVAP, Thulium laser vaporization of the prostate; ThuVARP, Tm;YAG Vaporesection;ThuVEP, Tm;YAG Vapoenuc;eatopm; TURP, transurethral resection of the prostate.

Advantages

- Precise cutting
- Smoother incisions
- Greater accuracy
- Energy efficiency
- Minimal collateral damage.

Disadvantages

- Charring: No evidence to support
- Increased incontinenece and dysuria
- Cannot be used as lithotripter.

COMPLICATIONS

Intraoperative

- No TURP syndrome
- Intra- or early postoperative bleeding: 3.4% of patients
- Rate of blood transfusions varied from 0% (17) to 2.2% (2) for ThuVEP.
- No transfusions during or after vaporesection of the prostate.

Early Postoperative

- Symptomatic UTI: 6.8% (8.3% UTI after TURP)
- Second look procedure: 2.2%
- Recatheterization required: 1.1%
- Higher rate hematuria (3.1% vs 1.4%) and UTI (15.4% vs 4.2%) in patients with pre-operative urinary retention
- Transitory early urge incontinence: 23.1% vs 31.3% (TURP)
- Dysuria for ThuVARP in 8.6% versus 7.1% for TURP
- Irritative symptoms 26.2% and 29.3% (TURP).

Late Postoperative (follow-up of 18 months after ThuVARP and ThuVEP)

- No re-operation or recatheterizations
- De-novo erectile dysfunction was not reported.
- 55% reported retrograde ejaculation compared to 65% after TURP
- Urethral stricture (1.9% vs 6.5% in TURP)
- ThuVEP:
  - Retreatment: 2.2% (using ThuVARP).
  - Transient recatheterization: One patient (1.1%)
  - Urethral stricture: 1 patient (1.1%): VIU done
  - Transient recatheterization: 5.6% of patients with prior retention
  - The re-operation rate: not affected by prior retention
- ThuVEP and ThuLEP Vs HoLEP as comparable techniques:
  - Long-term results awaited.
  - Long-term anatomical data is of interest
- Tm:YAG Vs Ho:YAG (LE:4)
  - As effective in patients on anticoagulative drugs
  - Ho:YAG, has lower coagulative properties (pulsed energy).

RECOMMENDATIONS

Table 43.4: Recommendations for ThuVARP and ThuVEP

	LE	*GR*
ThuVARP is an alternative to TURP for small and medium sized prostate	1b	A
ThuVARP and ThuVEP are suitable for patients at risk of bleeding or taking anticoagulant medication	3b	C
ThuVEP is an alternative to TURP, to HoLEP and OP for large size prostates	1b	A

44

Vaporization/Enucleation: Debate

• Percy Jal Chibber • Hemendra N Shah

VAPORIZATION VERSUS ENUCLEATION OF THE PROSTATE

• **Percy Jal Chibber**

VAPORIZATION

- Safer
- Ideal for high-risk patients
- No blood loss/fluid absorption
- Safe with antiplatelet medication
- No morcellation
- Catheter removal 24 hours
- Low learning curve.

Patient Selection

- Nonhigh-risk patient with prostate < 60 mL
- Nonhigh-risk patient with prostate > 60 mL
- High-risk patients:
  - Low ejection traction (EF)
  - On anti-platelet agents or anticoagulants
  - 80 consecutive patients prostate 60 mL to 160 mL
  - 37 PVP/HPS versus 43 HoLEP
  - 22% of patients intended to be treated by PVP needed conversion to some other procedure
  - 33% of PVP patients required > 1 fiber.

Results

Table 44.1: Results for different vaporization process

	HoLEP	*PVP/HPS*
• IPPS	88%	87%
• QOL	83%	80%
• Qmax	260%	195%
• PVR	96%	87%
• PSA	88%	60%
• TRUS VOL	78%	52%

Table 44.2: Holmium laser enucleation of prostate (HoLEP) vs greenlight laser photoselective vaporization of prostate (PVP)

This study is currently recruiting participants	Clinical Trials.gov identifier:
Verified January 2012 by Royal Victoria Hospital, Canada	NCT01494337
Sponsor Royal Victoria Hospital, Canada	First received: December 5, 2011 Last updated: January 6, 2012
Collaborator: McGill University	Last verified: January 2012 History of Changes
Information provided by (Responsible party): Mostafa Elhalali, Royal Victoria Hospital, Canada	

CONCLUSION

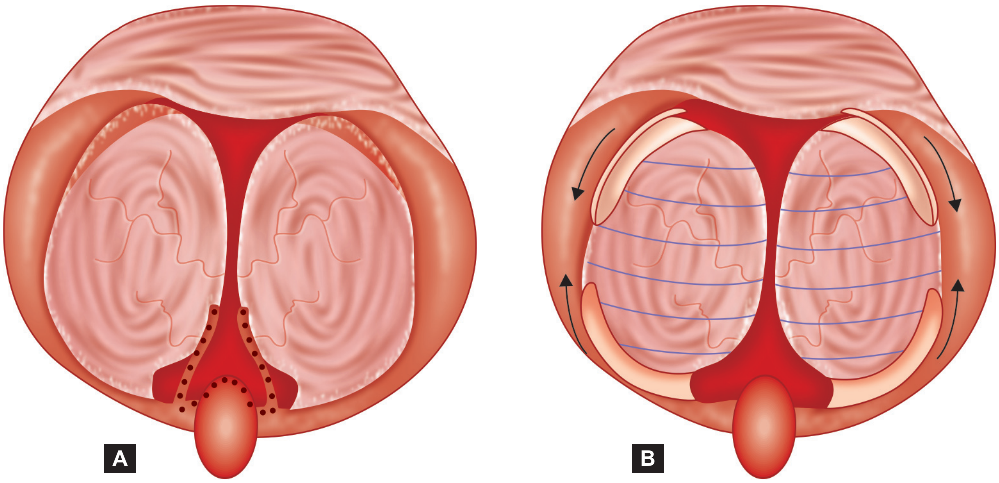
- PVP is as effective as HoLEP for prostates < 60 g, but easier to learn and perform
- HoLEP is similar to PVP in subjective improvement for prostates > 60 g, but better than PVP in objective parameters
- PVP versus HoLEP in HR patients: No head-to-head study available, but given the higher per-operative complication rates of HoLEP, PVP would be preferable.

PROSTATE ENUCLEATION

• Hemendra N Shah

ENUCLEATION TECHNIQUE: FRAYERS

Tried and True



Figures 44.1A and B: Transurethral Frayers prostatectomy

Dictionary Definition

Enucleate—To remove whole from an enveloping cover or sac.
Vaporize—To convert or be converted into vapor.

EVOLUTION FROM UROLOGY TO ENDOUROLOGY

Endourology refers to a specific specialty area in urology in which small internal endoscopes and instrumentation are used to see into the urinary tract and perform surgery.

Minimally Invasive Methods for Prostate Enucleation

- Open Surgery
  - Frayers
  - Millins
  - Endoscopic (Notes)
  - Electric current
    - Monopolar
    - Bipolar

- Lasers
  - Holmium
  - Thulium
  - Diode
  - KTP.
- Laparoscopic
  - Conventional
  - Single port (SILS)
    - Transumbilical
    - Transvesical
- Robotics

Holmium laser enucleation of the prostate (HoLEP) combined with transurethral tissue morcellation: An update on the early clinical experience Peter J Gilling, FRACS, Kathie Kennett, RN, Akhil K Das, MD, David Thompson, and Mark R Fraundorfer, FRACS

The place of HoLEP and intravesical morcellation in the urologist's armamentarium remains to be defined. The minimal morbidity achieved with HoLEP with large prostate glands and the ability to remove this tissue from the bladder with efficient transurethral morcellation may make this combination an important alternative to the larger TURP or smaller open prostatectomy.

Evolution of HoLEP

Ablation (HoLAP)

- Slower and hence limited to small prostate.
- High rate of fiber wear-out.
- No tissue retrieved for HPE.

Resection (HoLRP)

- One-third tissue retrieved for HPE. Inferior quality
- Longer operating time.

Enucleation (HoLEP)

- Feasible due to development of tissue.

HoLEP: No Size Limitation!!	
Journal of Endourology Volume 18, November 2, March 2004 © Mary Ann Liebert Inc Does perioperative outcome of transurethral holmium laser enucleation of the prostate depend on prostate size? Rainer M Kuntz, MD, Karin Lehrich MD and Sascha Ahyai	Infuence of prostate size on the outcome of holmium laser enucleation of the prostate Hemendra N Shah, Hiren S Sodha, Shabbir J Kharodawala, Amit A Khandkar, Sunil S Hegde and Manish Bansal Urology, RG Stone Urological Research Institute, Mumbai, India

<table>
<tr><th colspan="2">Holmium Laser Enucleation of the Prostate: A Size-Independent New "Gold Standard"
Ehab A Elzayat, Enmar I Habib and Mostafa M Elhilali</th></tr>
<tr><td>Holmium laser enucleation of the prostate—outcomes independent of prostate size?

Michaell R Humphreys, Nicole L Miller, Shelly E Handa, Colin Terry, Larry C Munch and James E Lingeman*

From the Department of Urology, Mayo Clinic (MRH), Phoenix, Arizona, Department of urology, Vanverbilt Univeristy (NLM), Nashille, Tennessee, and Clarian/Methodist Hospital (SHE, CT, LCM, JEL), Indianapolis, Indiana</td><td>Journal of Endourology
Volume 21, November 2, February 2007
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Holmium Laser Enucleation of the Prostate: Comparison of Outcomes According to prostate size in 97 Japanese patients</td></tr>
</table>

Guidelines

EAU Guidelines on laser technologies
Thomas RW Herrmann[a], Evangelos N Liatsikos[b], Udo Nagele[c], Olivier Traxer[d], Axel S Merseburgera
EAU Guidelines Panel on Lasers, Technologies

Holmium and Thulium Enucleation

Table 44.3: Recommendations for holmium and thulium enucleation

Recommendations	
•	HoLEP can be offered to any patient with BOO and BPH (level 1A evidence)
•	ThuVEP can be offered as an alternative to TURP, to HoLEP and OP for patients with large-sized prostates. (level 1B, 2B evidence)

Source: European urology.2012:61;783-95

HoLEP: A Complete Procedure

Table 44.4: Comparison of postoperative reduction in PSA and TRUS

Post-operative reduction in PSA	*Post-operative reduction in TRUS volume*
• 80 W green-light KTP laser – 32%–1 year – 17%–3 years • TURP–70–75% • HoLEP–80–85% • Open prostatectomy—90–95%	• Laser vaporization—40% (15–50%) • TURP—60% • HoLEP—80%

Source: Gilling PJ European urology. 2007; 52:1569-70

Durability

Table 44.5: Durability for HoLEP

<table>
<tr><th colspan="2">Retreatment rate 0–1.4% at 8 years after learning curve</th></tr>
<tr><td>Holmium laser enucleation of the prostate: Results at 6 years</td><td>Holmium laser enucleation of the prostate (HoLEP): Long-term results, reoperation rate, and possible impact of the learning curve</td></tr>
<tr><td>Peter J Gilling[a], Tevita F Aho[b], Christopher M Frampton[c], Colleen J King[a], Mark R Fraundorfer[a]</td><td>Ehab A Elzayat, Mostafa M Elhilali*</td></tr>
<tr><td colspan="2">Experince with more than 1000 Holmiuim laser prostate enucleations for benign prostatic hyperplasia
Amy E Krambeck, Shelly E Hand and James E Lingeman*

From the Methodist Hospital Institute for Kidney Stone Disease, Indianapolis, Indiana</td></tr>
</table>

Source: Gilling PJ, ET AL Eur Urol 2008 aPR;53 (4):744-9; *Elzayat EA, Elhilali MM. Eur Urol 2007;52 (5):1465-71*

Complications: HoLEP versus PVP

Holmium laser enucleation versus photoselective vaporization for prostatic adenoma greater than 60 Ml: Preliminary results of a prospective, randomized clinical trial.

Table 44.6: Intraoperative and postoperative complications

	No HoLEP (%)	*No PVP (%)*	*P value*
Conversion	0	8 (21.6)	0.001
Failed voiding trial	1 (2.3)	4 (10.8)	0.1
Hematuria	2 (4.6)	2 (5.4)	0.7
Clot retention	2 (4.6)	0	0.2
Urge incontinence	8 (18.6)	6 (16.2)	0.3
SUI	5 (11.6)	2 (5.4)	0.3
Retreatment for residual adenoma	0	2 (5.4)	0.1

Source: Elmansy H et al. J Urol. 2012 ;188;216-221.

Table 44.7: Objective and subjective outcome

% change	*HoLEP*	*PVP*	*P value*
IPSS	88	87	0.5
QOL	83	80	o.4
Q max	260	195	0.02
PVR	96	87	0.02
PSA	88	60	0.04
TRUS volume	78	52	<0.0001

Early subjective functional results (maximum flow rate and post-void residual urine) of holmium laser enucleation appear to be superior to those of photoselective vaporization

Source: Elmansy H et al. J Urol. 2012;88:216-21.

HoLEP: Is that Time Consuming?

Transurethral holmium laser enucleation versus transurethral resection of the prostate and simple open prostatectomy—which procedure is faster?

Table 44.8: Resection speed and operative time

	Mean/Median gm resected tissue (range)	*Mean/Median gm/min Resection speed (range)*	*Mean/Median mins operative time (range)*
Group 1			
HoLEP	37.2/32 (10–102)	0.61/0.56 (0.15–1.56)	62.2/60 (21–124)
TURP	37.2/32 (10–102)	0.51/0.47 (0.16–1.15)	73.8/70 (30–170)
p-value	1.0	0.003	<0.001
Group 2			
HoLEP	87.9/86 (45–150)	0.92/0.86 (0.51–1.72)	101.3/95 (42–200)*
OP	87.9/86 (45–150)	1.01/0.96 (0.45–1.82)	89.8/90 (55–130)
p value	1.0	0.14	0.21

In trained hands HoLEP is faster for medium prostates than TURP while no significant gain is attained for small prostates. Compared to OP HoLEP resection speed is similar except for huge prostates.

Source: Ahyai SA et al. J Urol. 2012:187;1608-13.

Advantages

Tissue for postoperative histopathological evaluation.

Cost Effectiveness: Multiple Fiber use

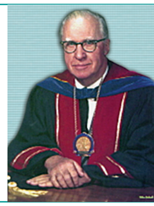
Multiple fibers needed to vaporize large prostate up to the capsule	⟷	Single fiber postoperative histopathological evaluation

I Humbly Propose.....

There is no tangible reason why laser vaporization should be offered to patients needing surgical intervention for BOO unless the expertise to perform enucleation is not available locally.

What Father of TUR had to say in 1943?

It soon became apparent, however, that the prosatic millennium had not actually arrived. Resectionists throughout the country discovered that the operation could not be performed with ease; that its technique was exceedingly difficult to acquire as well as to execute; that the incidence of morbidity and mortality could be alarmingly high following transurethral resection; and that unexpectedly poor end results were observed in a disconcerting number of patients.



Source: Reed M Nesbit in his landmark 1943 book on transurethral prostatectomy

LEARNING CURVE TURP

Most authors suggest that a mean number of 40–50 procedures for each urologist are the minimum to achieve satisfactory skills on TURP.

Source: Alin A Cumpanas et al. TMJ. 2004, 54, (2) Mebust WK, et al, Urol. 1989;141:243-7

Can We Predict the Outcome of 532 nm Laser PVP? Time to Event Analysis

- The mean PSA decrease in year 1 was 28.5%.
- A lesser PSA decrease was found in patients with a prostate of 50 mL or less compared to that in patients with a prostate of greater than 50 mL (21.9% vs 42.9%, p = 0.05).
- All 4 patients who required reoperation for residual adenoma after year 1 had a mean PSA reduction of less than 20% during year 1.
- On TRUS the mean gland reduction was 48% vs 27%.

Source: Elshal AM et al J Urol. 2012:188;1746-53.

Guidelines
EAU Guidelines on Laser Technologies
Thomas RW Herrmanna, Evangelos N Liatsikosb, Udo Nagelec, Olivier Traxerd, Axel S Merseburgera EAU Guidelines Panel on Lasers, Technologies

Green Light Laser Vaporization

- Prostate size—42 to 108 grams
- PSA reduction range—31.8% to 61.2%
- Recommendations:
  - Alternative to TUR for small and medium prostate
  - Safe method for volume reduction in large prostate.

Is this Justified?

- Volume reduction of large prostate?
  - ...Channel TUR for BPH.

45

Preoperative Stricture will You Proceed? If Small Prostate and if Large Prostate

• Shailesh A Shah

STRICTURE URETHRA WITH BENIGN PROSTATIC HYPERPLASIA

- In two obstruction of urinary drainage system distal obstruction is taken care primarily to decide need of relieving second obstruction
- Treat stricture and leave prostate is standard teaching.

Management

It depends:

1. Location, type, length of stricture
2. Size of the prostate
3. Size of the surgeon: Ghost urologist.

Site of Stricuture

- Meatal stenosis, navicular fossa stricture with big size prostate will be planned together
- Long anterior urethral stricture, panurethral stricture with big size prostate cannot/ should not be managed together.

    Size of the prostate has no relation with amount of obstruction it produces.

WHY THEN SIZE MATTERS WHEN IT IS WITH STRICTURE?

- Stricture with small prostate after visual internal urethrotomy (VIU)—medical treatment for prostate
- Stricture with big prostate—TURP can be done.

If Preoperative not Diagnosed then What is the decision?

- If your resectoscope goes with difficulty do not operate prostate
- If small stricture – operate prostate
- If long stricture – do not operate prostate.

CONCLUSION

- Management of each case on its own merit
- All preoperative diagnosed case I hesitate to operate stricture and prostate together and in intra-operative diagnosis I use the discretion as per case.

46

Post-prostatectomy Bladder Neck Contracture

• Aneesh Srivastava

BLADDER NECK CONTRACTURE

- Incidence
  - Open prostatectomy: 0.14–20%
  - TURP : 0.3–9%
- Denslow FM. Recurrence of urinary obstruction after prostatectomy. JAMA 1918
- Robinson HP, Greene LF. Postoperative contracture of the vesical neck. J Urol. 1962.
- Jens Rassweiler et al. Complications of TURP. Eur Urol. 2006.

LASER PROSTATECTOMY

- HoLEP
- Interstitial laser coagulation
- KTP
- Diode
- Thulium

Table 46.1: HoLEP

Author	*Bladder neck contracture (%)*
Naspro et al.	5.4
Wilson et al.	0
Elzyat et al.	0.8
Ahyai et al.	3.1
Shah et al.	0.4
Gilling et al.	0
Kuntz et al.	1.7

Table 46.2: KTP

TURP group	*KTP Laser Prostatectomy 532 nm 120 W*
N = 55	N = 54
BNC in 2	BNC in 4

P value >.05

Al Ansari et al J urol 2010

Other Modalities

- TUNA
- TUMT
- Bipolar TUVP

Table 46.3: Etiology of bladder neck contracture

Open prostatectomy	*TURP*
Secondary to impaired healing	Exact mechanisms—unclear
Urinary leakage	The proposed predisposing factors are:
Inflammation	—Extensive resection of the bladder neck
	—Excessive fulguration at the bladder neck
	—Excessive heat in a small intraurethral adenoma
	—Prostate size < 20 g

Symptoms

- Usually present >1–2 month postoperative
- Most common presentation is
  - Weak stream
  - Incomplete voiding
  - Overflow incontinence
  - AUR.

How to Diagnose Bladder Neck Contracture

- History
- Uroflow/PVR
- Calibration
- Retrograde urethrography (RGU)
- Cystoscopy.

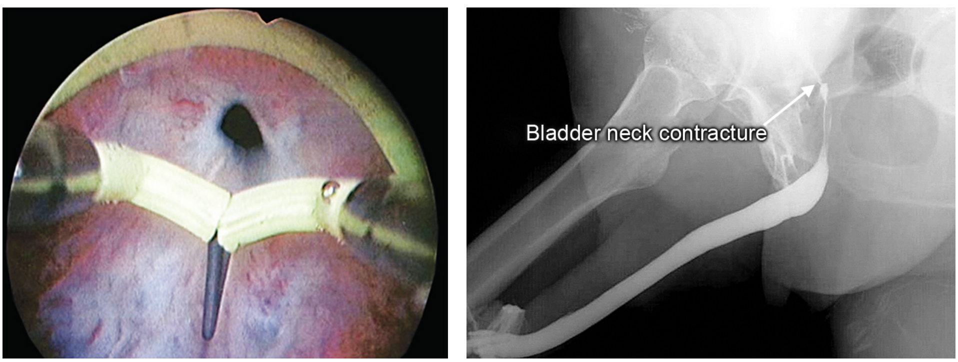


Figure 46.1: Incidence of bladder neck contracture

Severity of BNC was Arbitrarily Classified into three Grades

- Grade 1 (mild) —17F cystoscopic sheath can pass through the bladder neck by force but 22F sheath cannot pass through the bladder neck (diameter of bladder neck between 5 and 7 mm)
- Grade 2 (moderate) —17F cystoscopic sheath cannot pass through the bladder neck (diameter of bladder neck between 2 and 5 mm)
- Grade 3 (severe) —pinpoint-like hole (less than 2 mm).

Management of BNC

- Dilatation
- Transurethral surgery
  – Cold knife incision
  – Incision with Colling's knife
  – Laser incision.

Dilatation

- If the lumen can be calibrated (grade 1, 2)
  – Serial, graduated dilations up to 18–26F
  – May be followed by self catheterization to maintain patency variable regimes/time frames recommended
- Draw back
  – Recurrence rates as high as 70% reported
  – More than two procedure required.

Cold Knife Incision

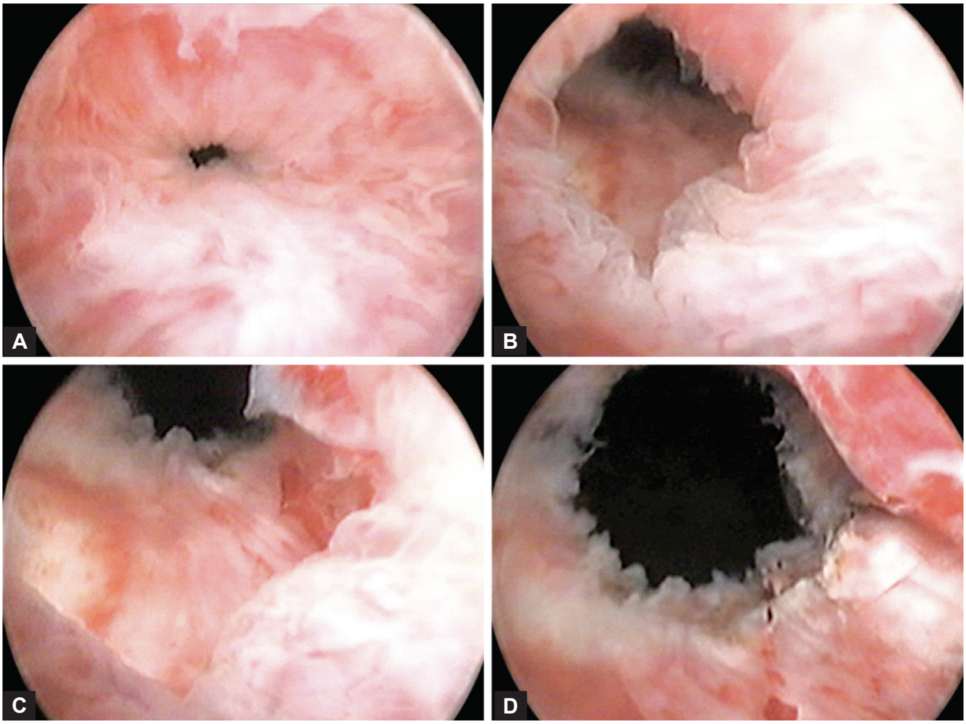
- Deep incisions at 4, 8 and 12 o'clock or 3 and 9 o'clock along the length of stricture.
- Recurrence rates in literature: 26–38%
  – Very low incidence of de novo incontinence
  – Westney et al, (2008, Curr Opin Urol)
  – Dalkin et al, (1996, J Urol)
  – Giannarini et al. Eur Urol 2008.

Incision with Colling's Knife

- Generally reserved for:
  – Longer, dense strictures in patients who failed Cold Knife incision, or
  – In patients with concurrent SUI in preparation for stent $\pm$ AUS
- Results/durability poorer than Cold knife incision but
  – Selection bias towards worse strictures
- Recurrence and de-novo incontinence rates are higher.

Holmium Laser Incision

- Small retrospective series with limited follow-up
- On the basis of limited evidence, BNC recurrence rates are lower than cold knife.



Figures 46.2A to D: Sequential images of urethroscopy performed immediately after cold-knife incision of an anastomotic stricture using a 24F, 0° lens instrument; (A) Competent external sphincter; (B) Passage through sphincter; (C) Incised anastomotic stricutre located approximately 15 mm proximally to the external sphincter; (D) End result of cold-knife incision

Thulium laser incision

Back et al. World J Urol 2007

N	=	14
Mean operative time	=	7 minutes
Mean postoperative catheter	=	6.5 hours
At 2 month follow-up change in Q-max	=	9 → 25 mL/s
At 12 month follow-up	=	Average Q max 23 mL/s
Change in AUA score	=	22 → 8

Two patients developed re-stenosis

Steps taken to prevent BNC after transurethral surgery

- To test the validity of TURP and TUIP as an alternative to TURP of the prostate, Ying-Huei Lee, et al. did a nonrandomized and retrospective study to review the incidence of severity.
  - N = 1435
  - Incidence of BNC
    - After TURP = 12.3%
    - After TURP + TUIP = 6%

- Result:
  - If the adenoma weight was >30 g BNC was completely prevented by using TURP + TUIP.
  - Adenoma weight and surgical type were determinant factors in predicting BNC
  - Ying-Huei Lee et al UROGY 65: 498–5OL03, 2005
  - For small glands < 30 g, it is advisable to leave a mucosal strip at 12 o'clock position.

CONCLUSION

- BNC occurs usually due to overzealous resection of a small gland
- Exact incidence with newer modalities remains to be seen
- Endourological management has a high success rate
- Reconstructive measures are rarely required.

SUGGESTED READING

1. Anger et al. J Urol 2005.
2. Besarani et al. (2004, BJU Int).
3. Ying-Huei Lee et al UROLOGY 2005;65:498–503.

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Management of Urethral Strictures

• Amod Tilak

URETHRAL STRICTURE (ENDOSCOPIC VIEW)

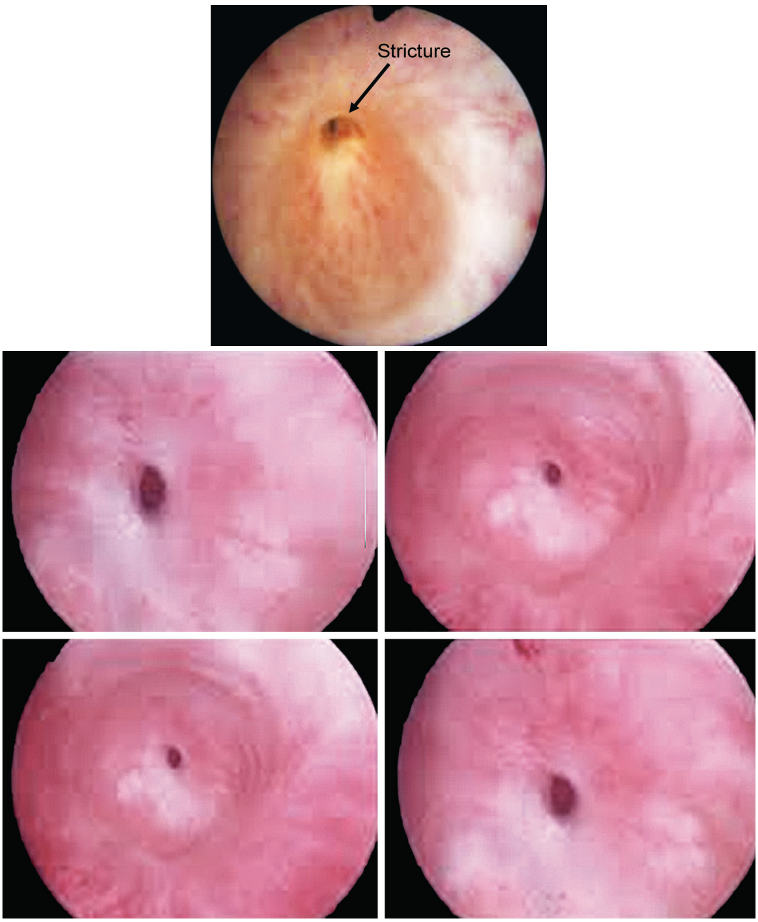


Figure 47.1: Urethral stricture (endoscopic view)

Treatment Approach to Pre-TURP Urethral Strictures

- Incidental detection of significant urethral stricture—Re-assess need for TURP
- Meatal/sub-meatal stricture—Do a formal meatotomy instead of excess dilatation.
- Consider otis urethrotomy/VIU for distal, penile/bulbar urethral strictures instead of excess dilatation.

Tips to Prevent Post-TURP Urethral Strictures

- Restrict the time of TURP to less than 1.5 hours (for large gland use alternative energy source)
- Prefer bipolar TURP, thin loops, pure cut option, minimize use of coagulation/fulguration'
- Superior quality Foley's catheter
- Avoid excess/prolonged catheter traction.

PENILE STRICTURE (TUBULAR)

Figure 47.2: Penile stricture (tubular)

PENOBULBAR STRICTURE

Figure 47.3: Penobulbar stricture

BULBAR STRICTURE

Figure 47.4: Bulbar stricture

Treatment of Penile and Bulbar Strictures

- Visual internal urethrotomy (VIU)
- Endocotie
  - Urethroplasty
    i. Single staged patch urethroplasty
       Buccal mucosa graft (BMG) (Barbagli)
       Penile/preputial skin viable patch
    ii. Two staged urethroplasty (substitution)
       Penile/preputial viable skin tube
       BMG tubed (Post-harvest).

PROSTATIC FOSSA STRICTURE

Figure 47.5: Prostatic fossa stricture

Management of Prostatic Urethral Strictures

- Endoscopic stricture resection
- TUR
- Use of laser as an energy source
- Endocotie
- Role of urethral stents
  (*Note*: Risk of urethral perforation/renting of thinned/fibrosed prostatic capsule)

UROLUME URETHRAL STENT

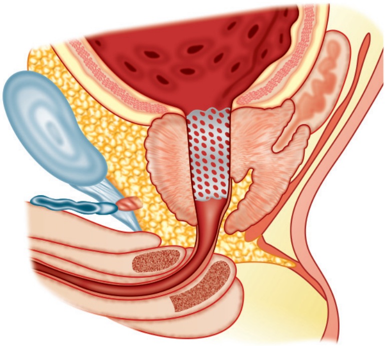


Figure 47.6: Urolume urethral stent

Need of Surgical Intervention

(Especially in cases of long-standing prostatic urethral strictures associated with recurrent UTI and with significant scarring).

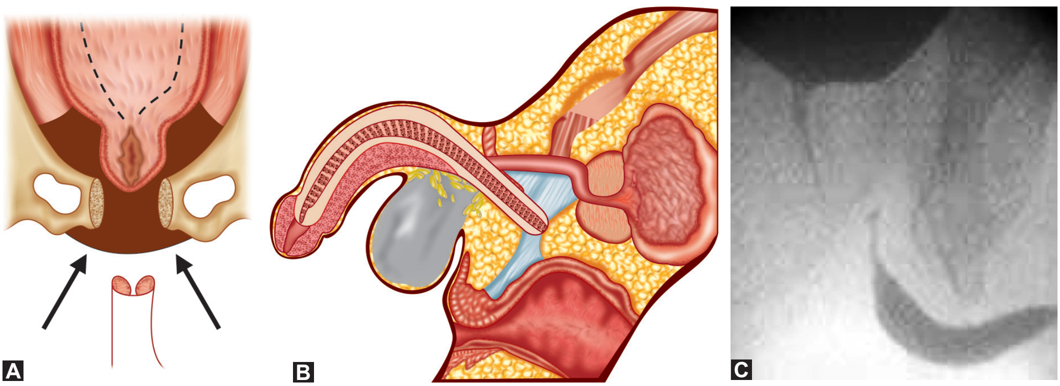
Approach

1. Open

- Perineal
  - Hyperextended lithotomy to increase exposure to prostatic apex (Jordan and Mc'Aninch 1997)— Mention with limitation.
  - Partial excision of sub-pubic arch (Lenzi–Barbagli).
- Abdominoperineal transpubic (Turner Warwich and Keith Water House, 1973)

2. Laparoscopic/Robotic Assisted

Waterhouse Procedure



Figures 47.7A to C: Waterhouse procedure

PROSTATIC URETHRAL STRICTURE

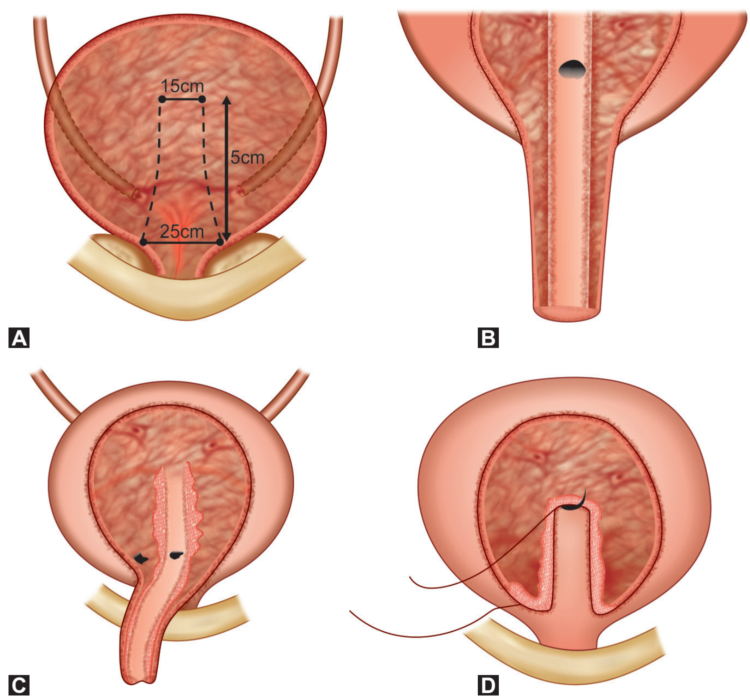
Excise/Bypass Strictured Prostatic Urethra

1. End to end anastomosis if possible (strictly tension free):
   - Bladder neck to membranous urethra (as after radical prostatectomy)
   - Bladder base mobilization to meet the urethra distally.
2. Length supplemented by:
   - Bladder flap tubed to reconstruct prostatic urethra (Tanagho's)
   - Viable preputial/penile tubed skin
   - BMG (Barbagli)—Limitation (needs to be harvested before being tubed).

Note:

- Possibility of stress incontinence due to loss of bladder neck support
- Retropubic space (void) to be filled with viable tissue, e.g. Omentum, Gracillis muscle.

TANAGHO'S PROCEDURE



Figures 47.8A to D: Tanagho's procedure

Table 47.1: Treatment options

Site	*Pre-TURP strictures*	*Post-TURP strictures*
Meatal/sub-meatal	Dilatation, otis, Meatotomy	Dilatation/self dilatation, meatotomy/meatoplasty
Penile	Dilatation/VIU	VIU/Urethroplasty
Bulbar	Dilatation/VIU	VIU/Urethroplasty
Prostatic	–	Endoscopic/Surgical intervention, use of laser
Bladder neck	–	Lateral incision/endocotie, endoscopic resection

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Surgery for Benign Prostatic Hyperplasia: Summation

• Rajeev Kumar

MEDICAL MANAGEMENT

- α-blockers
  - First line management unless contraindicated
  - Excellent efficacy, tolerability
  - Tamsulosin, alfuzosin, silodosin: Similar.
- 5-Alpha reductase inhibitors
  - Added efficacy
  - Prevent AUR, progression, surgery
  - Ideal for glands > 30/40 grams.

SURGERY

- Absolute indications
  - Same as always
- Failed medical management
- Consider earlier if:
  - Large gland (> 60 g)
  - Elevated PSA (> 1.5 ng/mL)
  - Previous AUR.

TRANSURETHRAL RESECTION OF THE PROSTATE

- The gold standard
- Safe and effective
- Usable in 95% patients
- Most widely practiced surgical procedure
- Cheap, widely available
- Regular part of training, easily learnt
- Not perfect: modifications even better.

HOLMIUM LASER ENUCLEATION OF THE PROSTATE

- Pros:
  - One stop shop for all prostates
  - Anticoagulated patients
  - Large glands.
- Cons:
  - Cost
  - Learning curve/availability.

THULIUM LASER

- Pros: Potentially similar to HoLEP
  - Continuous beam: Better coagulation
  - One stop shop for all prostates
  - Anti-coagulated patients
- Cons:
  - Lack of sufficient data
  - Cost
  - Learning curve/availability.

PHOTOSELECTIVE VAPORIZATION OF THE PROSTATE

- Pros:
  - Easy to learn
  - Low invasiveness
  - Anticoagulated patients
- Cons:
  - Cost
  - Efficacy
  - Still evolving.

ENUCLEATION OR VAPORIZATION

- Vaporization:
  - Easier to learn
  - Lower blood loss
  - Lower complications.
- Enucleation:
  - More rapid symptom relief
  - 2–4 year efficacy demonstrated
  - Tissue for pathology
  - Lower cost.

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Page numbers followed by *f* refer to figure and *t* refer to table

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